

# THE IRON AGE

THURSDAY, AUGUST 30, 1888.

## The Ericsson Sun Motor.

In view of the attention which the application of solar heat to motive power purposes has recently received in France, a contribution which the distinguished engineer, Capt. John Ericsson has just made to *Nature* will be read with special interest. It relates to his sun motor, to which he has given a good deal of time and attention within the past few years, and through his courtesy we are enabled to present engravings of it this week, together with his description.

India, South America and other countries, says Captain Ericsson, interested in the employment of sun-power for mechanical purposes, have watched with great attention the result of recent experiments in France, conducted by M. Tellier, whose plan of actuating motive engines by the

piston of the motive engine: Fig. 1 represents a perspective view of a cylindrical heater and a frame supporting a series of reflecting mirrors composed of narrow strips of window glass coated with silver on the under side. The frame consists of a light structure of wrought iron or steel, provided with transverse ribs, as shown by the illustration, each rib being accurately bent to a parabolic curvature whose focus coincides with the axis of the cylindrical heater. It need hardly be stated that the mirrors supported by the said transverse ribs continue from side to side of the frame, which accordingly resembles a parabolic trough whose bottom is composed of mirrors. It will be readily understood that this trough, with its bent ribs and flat mirrors, forms a perfect parabolic reflector, to which a cylindrical heater, as stated, may be attached to gen-

which Tellier's apparatus, tested at Paris, was intended to displace.

## DESCRIPTION OF THE ILLUSTRATED REFLECTOR.

1. The mirrors which reflect the solar rays are devoid of curvature, being flat narrow strips of ordinary window glass, cut to uniform width and length, perfectly straight.
2. The under sides of said strips are coated with silver by a process which prevents the action of the sun's rays from destroying the silver coating as in ordinary looking glasses.
3. The mirrors supported by the bent metallic ribs extending from side to side of the parabolic trough are held down by the heads of small screws tapped into the ribs. Thin slats of wood may be introduced between the mirrors and the ribs—

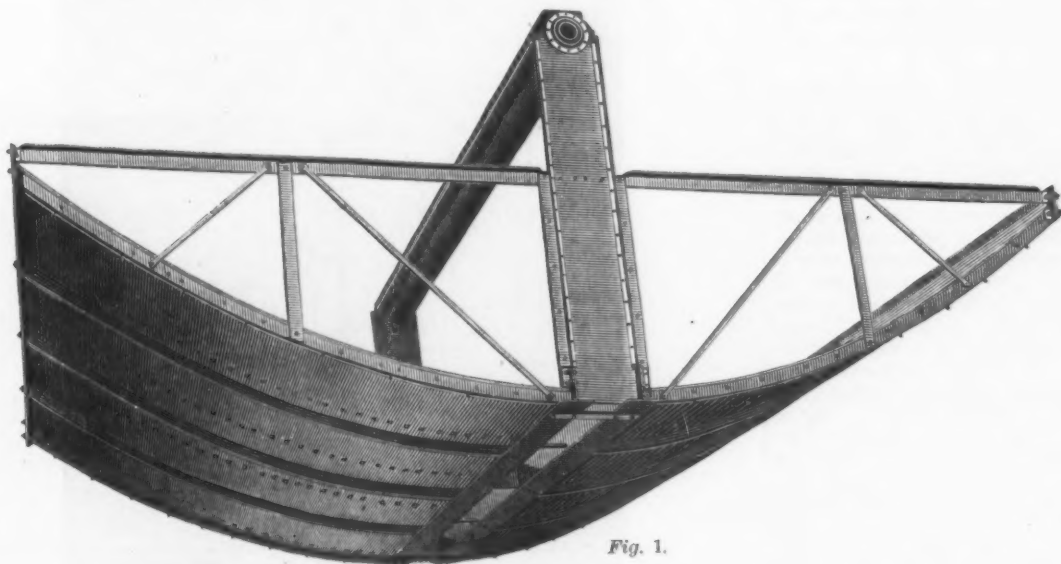


Fig. 1.

THE ERICSSON SUN MOTOR.

direct application of solar heat has been supposed to be more advantageous than the plan adopted by the writer of increasing the intensity of the solar rays by a series of reflecting mirrors. The published statements that "the heat-absorbing surface" of the French apparatus presents an area of 215 square feet to the action of the sun's rays, and that "the work done has been only 43,360 foot-pounds per hour," furnish data proving that Tellier's invention possesses no practical value.

The results of protracted experiments with my sun motor, provided with reflecting mirrors, as stated, have established the fact that a surface of 100 square feet presented at right angles to the sun at noon in the latitude of New York during summer develops a mechanical energy reaching 1,850,000 foot-pounds per hour. The advocates of the French system of dispensing with the "cumbrous mirrors" will do well to compare the said amount with the insignificant mechanical energy represented by 43,360 foot-pounds per hour developed by 215 square feet of surface exposed to the sun by Tellier during his experiments in Paris.

The following brief description will give a clear idea of the nature and arrangement of the reflecting mirrors adopted by the writer for increasing the intensity of the solar heat which imparts expansive force to the medium propelling the working

erating steam or expanding the gases intended to actuate the piston of the motive engine. Regarding the mechanism for turning the reflector toward the sun, engineers are aware that various combinations, based on the principle of the "universal joint" may be employed.

Concerning previous attempts made in France to utilize solar energy for mechanical purposes, it is well known that practical engineers, having critically examined Mouchot's solar engine, which M. Tellier proposes to supersede, find that it is incapable of developing sufficient power for any domestic purpose. Again, the investigations carried out by order of the French Government, to ascertain the merits of Mouchot's invention, show that irrespective of the great expense of silver-lined curved metallic reflectors for increasing the insufficient energy of direct solar radiation, these reflectors cannot be made on a sufficient scale for motors having adequate power to meet the demands of commerce; nor is it possible to overcome the difficulty of rapid wear of the delicate silver lining of the metallic reflectors consequent on atmospheric influence, which after a few hours of exposure renders their surfaces tarnished and ineffective unless continually polished. A glance at the accompanying illustration (Fig. 1) shows that the reflector constructed for my sun motor differs altogether from that originated by Mouchot,

an expedient of some importance in localities where the reflector is exposed to high winds.

4. It needs no explanation that the reflecting surface of the mirrors cannot become tarnished by atmospheric influence, since the bright side of the silver coating is permanently protected by the glass; hence it will be only necessary to remove dust from the mirrors, an operation readily performed by feather brushes secured to light handles of suitable length.

5. The frame of the reflector, being composed of rolled bars of iron or steel, requires no finish, excepting the top of the transverse ribs, which must correspond accurately with a given parabolic curvature. It should be observed that the needed accuracy is readily attained by a cutting tool guided by a bar of proper form.

6. Regarding cost of construction it will suffice to state that manufacturers of glass, both in the United States and Germany, supply the mirrors, cut to exact size and silvered, at a rate of 60 cents per square foot, the weight being 106 pounds per 100 square feet. Consequently the cost of the reflector and heater for the sun motor will not much exceed that of a steam boiler and appurtenances, including chimney. The cost of the engine, apart from the reflector, will not be greater than that of an ordinary steam engine.

7. With reference to durability it will be evident that the light metallic frame with its mirrors, and a heater acted upon only by reflected solar heat, will last much longer than steam boilers subjected to the action of fire, soot and corrosion.

Let us now briefly consider the distinguishing feature of the sun motor—namely, the increase of the intensity of the sun's radiant energy by parallel rays and flat reflecting surfaces permanently protected against atmospheric influence. It has been supposed that the lens and the curved reflecting surface, by converging the sun's rays, could alone increase the intensity of radiant heat. But Newton's demonstration, showing that the temperature produced by solar radiation is "as the density of the rays," taught me to adopt in place of curved surfaces and converging rays, flat surfaces and parallel rays, as shown by Fig. 2, which represents a transverse section of part of the reflector. The direct vertical solar rays, it will be seen, act on the mirrors, while the reflected rays, divided into diagonal clusters of parallel rays, act on the heater, the surface of which will thus be exposed to a dense mass of reflected rays, and consequently raised to a temperature exceeding 600° F. at noon during ordinary sunshine.

The cost, durability and mechanical energy of the sun motor being thus disposed of, it remains to be shown whether the developed energy is continuous or whether the power of the engine changes with the increase and diminution of zenith distance and consequent variation of atmospheric absorption. Evidently, an accurate knowledge of the diathermancy of terrestrial atmosphere is indispensable to determine whether the variation of the radiant energy is so great that the development of constant power becomes impracticable. Of course, manufacture and commerce demand a motor developing full power during a modern working day of eight hours. Observations relating to atmospheric diathermancy, continued during a series of years, enable me to assert that the augmentation of solar intensity during the middle of the day is so moderate that, by adopting the simple expedient of wasting a certain amount of the superabundant heat generated while the sun is near the meridian (as the steam engineer relieves the excess of pressure by opening the safety valve), a uniform working power will be developed during the stipulated eight hours. The opening of the safety valve, however, means waste of coal raised from a great depth at great cost, possibly transported a long distance, while the radiant heat wasted automatically by the sun motor is produced by fuel obtained from an inexhaustible storehouse free of cost and transportation.

It will be proper to mention that the successful trial of the sun motor, described and illustrated in *Nature*, vol. xxxi. p. 217, attracted the special attention of landowners on the Pacific coast then in search of power for actuating the machinery needed for irrigating their sun-burnt lands. But the mechanical detail connected with the concentration at a single point of the power developed by a series of reflectors was not perfected at the time; nor was the investigation relating to atmospheric diathermancy sufficiently advanced to determine with precision the retardation of the radiant heat caused by increased zenith distance. Consequently no contracts for building sun motors could then be entered into, a circumstance which greatly discouraged the enterprising Californian agriculturists prepared to carry out forthwith an extensive system of irrigation. In the meantime a simple method of concentrating the power of many reflectors at a given point has been perfected, while the retardation of solar energy caused by

increased zenith distance has been accurately determined, and found to be so inconsiderable that it does not interfere with the development of constant solar power during the eight hours called for.

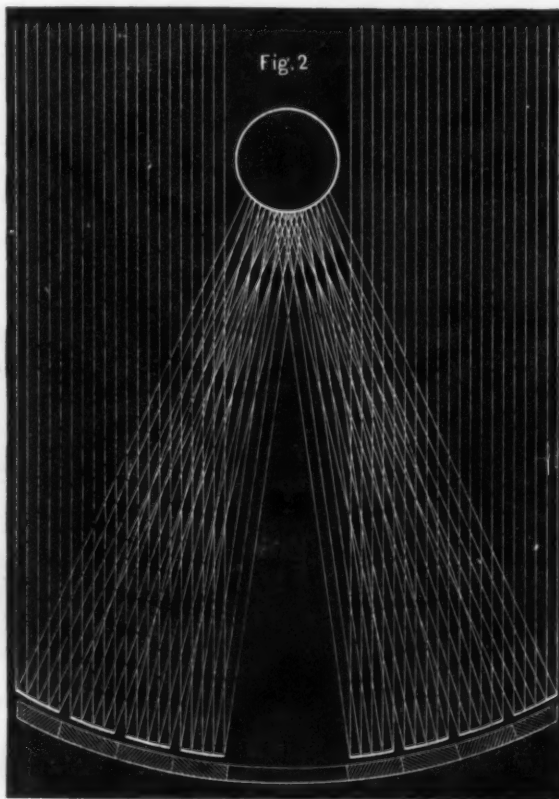
The new motor being thus perfected, and first-class manufacturing establishments ready to manufacture such machines, owners of the sun-burnt lands on the Pacific coast may now with propriety reconsider their grand scheme of irrigation by means of sun power.

#### Domestic Motive-Power by Atmospheric Exhaustion.

The system of power distribution by creating a partial vacuum in the supply mains, as developed in Paris, France, has

causing a slight draft, which aids the pump. Water is injected into the cylinder to obviate the rise of temperature which would otherwise occur from the compression of the rarefied air to atmospheric pressure. The pump is worked by direct connection with a horizontal Corliss condensing steam engine of 90 horsepower, making 36 turns per minute, and working with an initial steam pressure of 4½ atmospheres, cutting off at one-fifth. The efficiency of the pump is estimated at 93 per cent. of the power transmitted. The maximum demand for power, supposing all the motors to be at work at the same time, is 35 horse-power.

It can be proved that, with a perfect machine, 1 c. m. of air entering the main produces 13,530 kg. of work. In practice the air cylinder utilizes 93 per cent. of the



THE ERICSSON SUN MOTOR.

been referred to in *The Iron Age* several times since operations in connection with it were first commenced. In the last issue of the *Excerpt Minutes* of the proceedings of the British Institution of Civil Engineers, however, we find additional particulars originally contributed to the *Bulletin* of the Société Industrielle de Mulhouse by M. E. Dollfus. From these we take the following:

The principle consists in maintaining a vacuum, averaging 67 per cent., or 20 inches of mercury, but occasionally reaching to 75 per cent., or 22½ inches, in a reservoir serving to regulate the pressure in the pipes. The air-pump, an ordinary compressor working reversely, consists of a cast-iron cylinder, on the ends of which the suction-valves and discharge-valves are mounted. The piston, also of cast-iron, is formed with several grooves in the circumference, the two outer grooves being fitted with india-rubber rings. These rings are pressed against the cylinder by air passing through the piston. The valves are of india-rubber. The exhaust reservoir is 49 inches in diameter, 11½ feet in length. The air is discharged into a sheet-iron chimney, by which it is carried off clear of the engine-house, thus

power transmitted; of this proportion the exhaust motors in turn give a maximum of 60 per cent.; the loss of head in the main is 5 per cent.; lastly, the air yields only 85 per cent. of its total capacity for work. The resulting coefficient is 45 per cent., and the actual work of 1 c. m. of air is  $13,530 \times 0.45 = 6088$  kg. (44,034 foot-pounds). From the exhausted reservoir a main is laid in the sewers or in trenches, and is provided with as many branches as necessary. A junction is made with the pipes for each subscriber, who is furnished with a special stop-cock.

The principal pipes are of cast iron, in lengths of 1 m., and of varying diameter, 10 inches and 8 inches from the pumping station to the sewer, and 8 inches and 4 inches in the sewer or trench. They are from 0.25 inch to 0.40 inch in thickness. The joints of the pipes are run with lead against an india-rubber ring, and calked in the usual way. The conduits do not exceed from 1 mile to 1½ miles in length. Greater lengths than these induce very sensible losses of head; hence the necessity for creating a series of centers. Condensation water in the pipes is not provided against, as the water carried by the atmospheric air vaporizes under the low press-

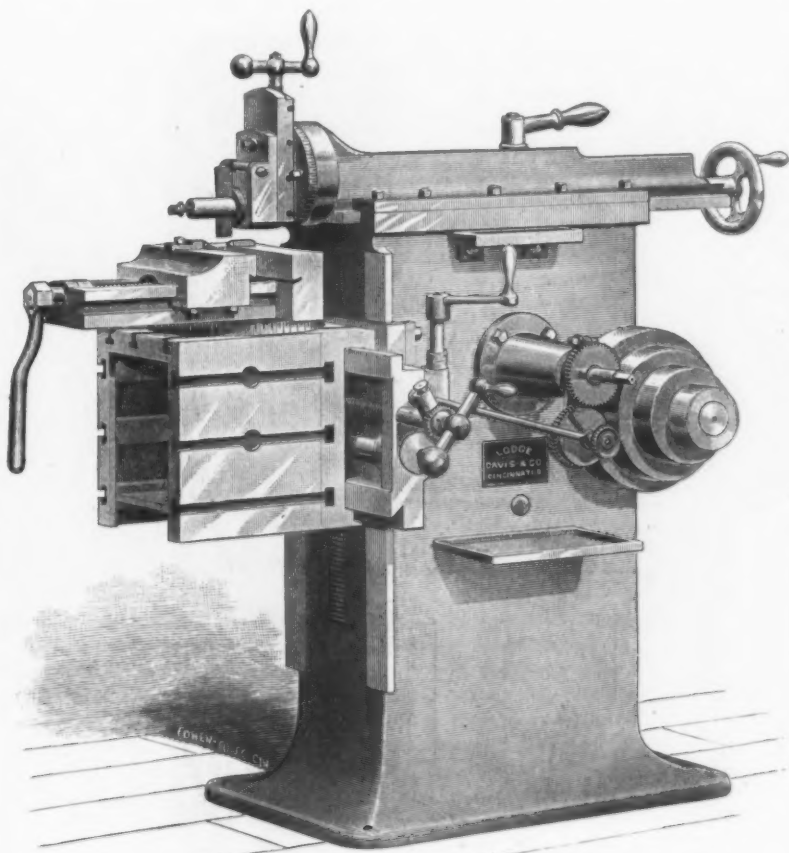
ure. But, on the other hand, the air, in entering the conduit, expands rapidly and falls in temperature, when the entering moisture may freeze and clog the motors. For such a contingency the company decline responsibility.

By the secondary motors the pressure of the air is converted into work at once utilizable by the operator. Motors of three types have been employed—oscillating, rotative and trunk. The first has fallen into disuse, in consequence of waste by leakages. The operator simply turns a tap to start the engine, no further attention being necessary while his motor is at work. The rotative motor is specially constructed for small powers of from  $\frac{3}{8}$  to  $\frac{1}{2}$  horse-power. The trunk engine is employed for powers of from  $\frac{1}{4}$  to 1 horse-

power varies from 0.114 cent to 1.32 cents per 1000 revolutions, or from 1.77 cents to 10 cents per hour. The hygienic advantage of the exhaustion motor in promoting ventilation is obvious.

#### New 15-Inch Shaper.

We show on this page a new 15-inch shaper, built by Messrs. Lodge, Davis & Co., of Cincinnati, Ohio. The stroke of the tool can be changed and adjusted while running. When the end of the ram is at the end of motion of 15 inches it has a bearing in the column slide of 21 $\frac{1}{2}$  inches. Being operated by a crank motion, the stroke of the shaper is at all times positive, and it will invariably plane to a line,



NEW 15-INCH SHAPER, BUILT BY LODGE, DAVIS & COMPANY, CINCINNATI, OHIO.

power. The efficiency of the motors varies from 40 per cent. to 60 per cent., according to the size of motor used. The number of revolutions of each motor is registered by a counter, in which a roller turns in contact with a friction-plate, at a greater or less radial distance from the center of the plate, according to the pressure developed. Thus the variation of pressure is compensated for by the registering of a greater number of turns relatively as the pressure is augmented and a less number as it is reduced.

The economy effected by the use of these domestic motors is exemplified by the case of a brush-maker, who works a saw and five drilling lathes. Now, with a  $\frac{1}{2}$  horse-power motor, five men do the work of eight employed previously, and the expenditure is about 60 cents per day for the motor-power, against about \$3 for three men. In another case, that of the manufacture of tortoise-shell combs, two lathes are employed, to drive which a man was formerly paid \$1 per day of ten hours. Now, with a motor, the cost for power is only 50 cents per day. The charge for power of from  $\frac{1}{8}$  horse-power to 1 horse-

making it a particularly desirable tool for diemakers where accurate work is required. The vise is swiveled, and may be transferred from the top of the table to the side, adapting the machine to a larger range of work. The vise opens 8 inches, is 2 inches deep and 10 inches wide. With each machine is furnished an improved box table. Work can be bolted on the top and both sides. Being made in this form it has in addition a degree of stiffness not possessed by one-sided tables. It can also be utilized as a receptacle for tools, &c. The table may be removed and the work bolted to the slotted apron to which the box table is attached. This is desirable in planing the tops and sides of heavy pieces, such as legs of machines, &c. The machine is heavily geared, giving great power with high-belt velocity. The gears are well proportioned, and are cut from the solid; the machine has a vertical adjustment of 18 inches, and a cross motion of 18 inches. The tool block has 5 inches feed in any direction. All the bearings are accurately scraped to a fit. The machine has four changes of speed, and weighs 1500 pounds.

#### Solid Drawn Copper Tubes.

At the Glasgow Exhibition the Tharsis Sulphur and Copper Company exhibited cylindrical copper billets used for making solid drawn tubes by a process invented by Mr. James Robertson. These billets are usually about 30 inches long and from 4 inches to 7 inches diameter. *Industries* describes the process as follows:

In practice, a hole 1 $\frac{1}{4}$  diameter is bored right through the billet by drills from either end. The billet is then lightly skinned in a lathe to clean the surface, after which it is inclosed in a cast-steel container made in halves and bored out to suit the particular size of billet. This container rests on a stout bed plate, and remains stationary while a pear-shaped mandrel attached to a revolving hydraulic ram is entered at one end of the hole in the billet. A flexible tube inserted in the other end of the hole supplies lubricant. On pressure being applied to the revolving ram which carries the mandrel, the metal of the billet gradually flows back in the container, in front of the mandrel, and in a few minutes the mandrel pierces the elongated billet, leaving a shell having the original outside diameter, but with a hole corresponding to the size of the mandrel. A sample cut in halves shows the operation partially completed. After annealing, this shell is ready for drawing hot in rolls, or cold in the usual draw benches. The temperature of the shell or mandrel never exceeds 120° F., and the only waste occurring in the process is the 1 $\frac{1}{4}$ -inch hole through the center of the billet, and the surface cleaning. This hole, however, is only a convenience and is not an essential, for very frequently tubes are pierced out of the solid, it being only a question of a little more power and a somewhat longer time.

Oval billets are produced for another process of making solid drawn copper tubes, and measure 24 inches by 10 $\frac{1}{2}$  inches by 2 $\frac{1}{2}$  inches thick, which are rolled hot in the direction of the shortest diameter till they become circular disks about 30 inches diameter. By means of suitable dies and mandrels in a hydraulic press, and after annealing, these disks are cold worked successively into basins, conical domes, and ultimately into parallel tubes having one end closed. On punching out this closed end, a shell about 5 feet long remains for finishing on the draw benches, and, with the exception of the closed end, all the metal of the original oval cake is in the shell.

The Navy Department has invited proposals for the construction of one steel submarine torpedo boat complete, with torpedo fittings and appendages. The vessel is to be of the best and most modern design, and, so says the circular, must be constructed within the United States and of material of domestic manufacture. Bids will be received until January 4 next. Some time ago Messrs. Cramp & Sons made two propositions for the construction of a vessel of this description, but they were rejected because of failure to guarantee its serviceableness.

The trunk manufacturing interest of Louisville, Ky., is larger in the aggregate than at any other point in this country except Newark, N. J., and is principally carried on by three factories. To give an idea of the rapid growth of this industry: the firm of Laub, Stromberg and Kraus began work five years ago in an attic, or loft, employing five men altogether. To day they have on their pay-roll 100 workmen, have a factory four stories high and covering about 200 x 400 feet of ground. Their orders are so numerous that they cannot take any more, and have called in their salesmen. Their trade extends all over this country and into Mexico.

### The Cruiser Charleston.

In this issue we publish engravings of the first of the new cruisers, the Charleston, which was launched on the Pacific Coast a few weeks ago, the builders being the Union Iron Works, of San Francisco, Cal. Though we briefly described the vessel at the time, some of the particulars will bear repetition.

The Charleston has a central open superstructure, twin screws and two masts with military tops in which machine guns are mounted. She was built upon the plans of the swift Japanese cruiser Naniwa-Kan, built by Sir G. W. Armstrong, with such modifications as were rendered necessary by the conditions of the United States service and the substitution of 8-inch for 10-inch guns. The principal dimensions of the vessel are: Length over all, 320 feet; length on load line, 300 feet; breadth, 46 feet; mean draft, 18 feet 6 inches; displacement to mean load line, 3730. The indicated horse-power, with natural draft, is 5000; with forced draft, 7500. The maximum speed per hour is 18.9 knots. The crew will number 325 men. The vessel is double bottomed under engines and boilers. She has also a curved or turtle-back steel deck from 2 to 3 inches thick running from stem to stern and protecting everything below it, being a foot above load-water line at the crown and then sloping at its edges to 4 feet below the water. The coal bunkers are so arranged as to furnish further protection.

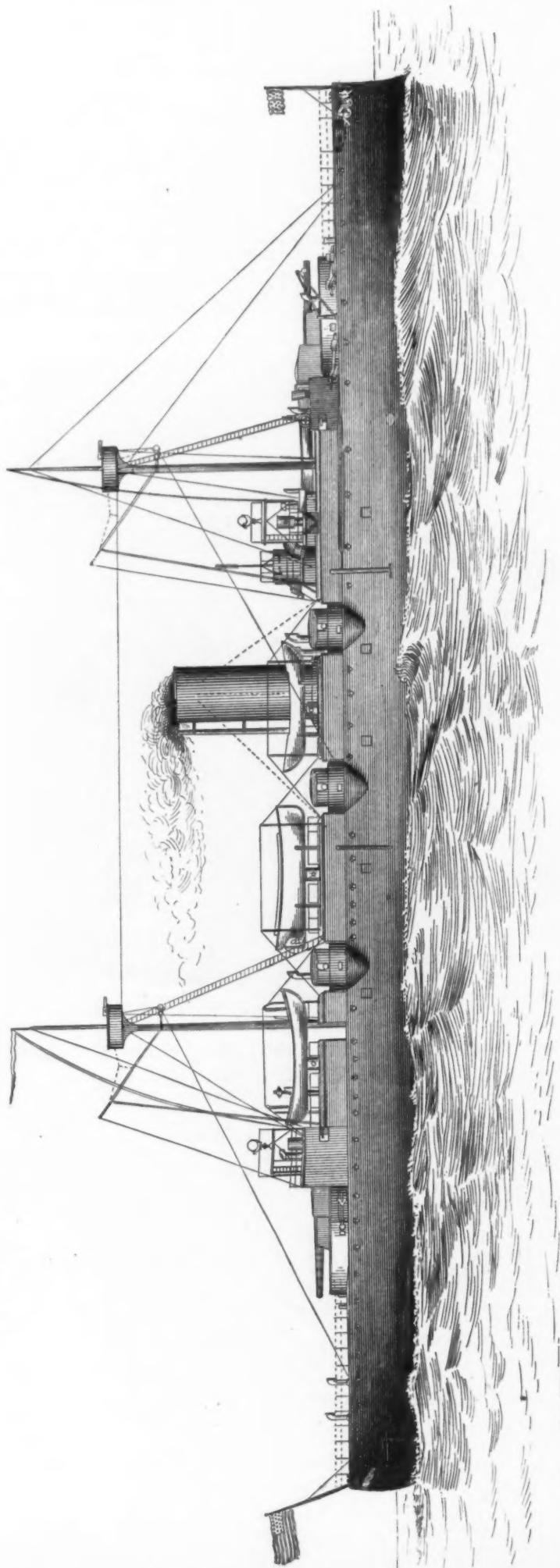
A chart and wheel house is built under the bridge, containing steering wheels, engine telegraphs, steering lever, indicators, speaking tubes to the conning tower and other parts of the vessel, folding chart-table, chart-lockers, telescope racks, &c. A conning tower is worked on the bridge. It is of mild steel, 2 inches thick on the vertical sides; the cover,  $\frac{3}{4}$  inch. It is fitted with steering lever, engine telegraphs, indicator and speaking tubes. The floor has a grating for communication with the chart house.

Hydraulic steering gear is fitted to the vessel, with wheel or levers in the conning tower and chart house. The steering gear is placed under the protective deck, well below the water.

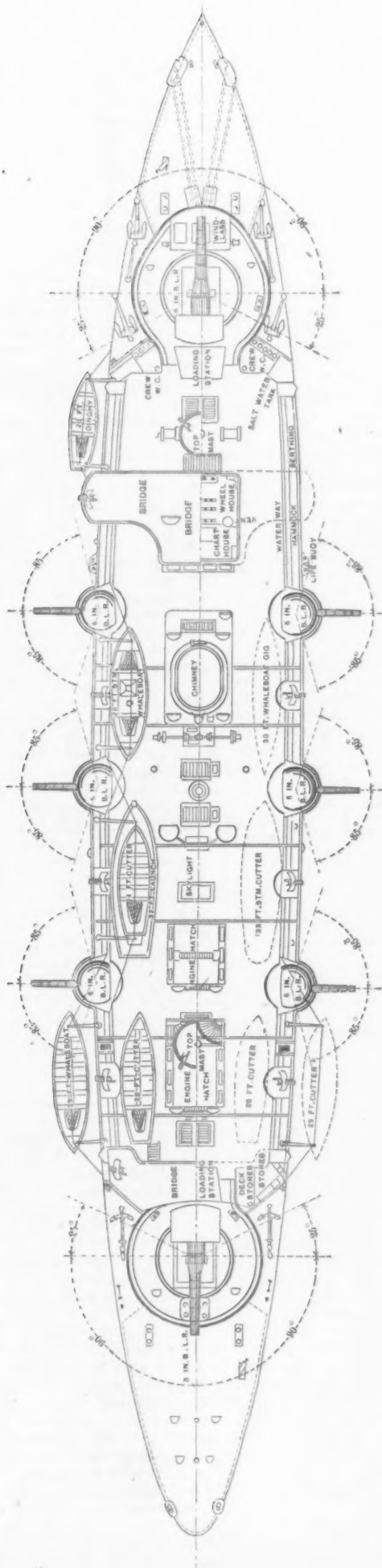
Two electric, incandescent, electric lighting plants are arranged to work on the same circuit, each capable of providing at least 3200 candle-power of light. The lamps are so placed as to fully light up all parts of the ship, including coal bunkers, magazines, shell and ammunition rooms, running lights and lights for use on deck and aloft. Provision is made for draining water from the storerooms, chain lockers, coal bunkers and all other compartments of the vessel to places from which the water can be pumped by hand or steam. The ventilation of the living and storage spaces is by the exhaust system, and while natural ventilation is used as far as possible, artificial exhausts are provided for all compartments below the spar deck by means of two blowers of 10,000 cubic feet capacity per minute. The foul air of the coal bunkers is led into the funnel casing, and the bunkers have fresh-air pipes with large mouths opening into the hammock berthing.

The horizontal plating of the protective deck is 2 inches thick, the sloping sides 3 inches.

The main battery consists of two 8-inch breech-loading rifles, mounted at each end of the superstructure in light barbettes about 3 feet high. Six 6-inch rifles are mounted on the same deck, three on a side, in projecting sponsons. The secondary battery consists of four 6 pounders, rapid-fire rifles, six Hotchkiss revolving cannon and four Gatlings. Four above-water torpedo guns or launching tubes are fitted. The motive power is furnished by two



THE U. S. CRUISER CHARLESTON, BUILT BY THE UNION IRON WORKS, SAN FRANCISCO, CAL.



The Main Deck.

horizontal compound engines placed in separate water-tight compartments and, as previously stated, developing 7500 indicated horse-power under forced draft. Each engine has a high and low pressure cylinder of 44 and 85 inches in diameter with a stroke of 36 inches. The crank shafts are a single forging of steel. The circulation and air pumps are worked by independent engines. The screws are three-bladed, about 14 feet in diameter. There are six main boilers in two separate water-tight compartments, all with one smoke-pipe. Those in the forward compartment are 11 feet in diameter, and in the after compartment, 11 feet 6 inches. Air is driven into each fire-room to maintain an air pressure of 2 inches of water. There will be a steam-starting and reversing gear, distilling apparatus, auxiliary bilge and fire pumps, ash-hoisting engines, a windlass for hoisting the anchor and for other heavy work, a steam winch for hoisting boats and light work generally, and steam turning gear for the main engines. The coal supply at normal draft is 328 tons, but the bunker capacity is 800 tons. The following table shows the endurance and radius of action at different speeds:

I. H. P.	Speed.	Coal per hour.	Distance can steam on 328 tons.	Distance can steam on 800 tons.	Coal per hour per I. H. P.
	Knots.	Tons.	Knots.	Knots.	Lbs.
7,650	18.9	7.51	805.14	2,012.85	2.2
6,000	17.5	5.62	965.75	2,491.12	2.1
5,000	16.5	4.46	1,183.71	2,939.60	2.0
2,750	13.0	2.45	1,697.93	4,244.89	2.0
1,300	10.0	1.07	2,990.00	7,476.00	2.0

#### Johnstown Freight Rates.

A few days ago the Baltimore and Ohio Railroad Company and the Pennsylvania Railroad Company entered into an agreement to make the same rates on iron from Johnstown, Pa., to points 100 miles from Pittsburgh as are in effect from Pittsburgh to these place. The new rates went into effect on Monday the 20th inst. The circular issued by the Baltimore and Ohio Railroad reads as follows: "Rates on articles of iron and steel manufacture, in full carloads, except on steel rails and fastenings, from Johnstown, Uniontown, Everson, Scottdale and Mt. Pleasant to all points west of Bellaire, will be the same as from Pittsburgh. The rates authorized in this tariff will also apply from stations between Johnstown and McKeesport, the latter not inclusive, and from stations between Mt. Pleasant and Uniontown." The tariff issued by the Pennsylvania Railroad Company is the same. In addition to the above taking effect at the same time, both roads reduced the rate on steel rails from Johnstown to Chicago from \$2.75 per gross ton to \$2.64, and from Pittsburgh to Chicago from \$2.50 to \$2.40. From this it will be seen that the advantage on steel rails to Western points is still in favor of the Pittsburgh manufacturers. Some of the Pittsburgh manufacturers complained that the railroads, by making the new rates on iron, were discriminating against Pittsburgh in favor of Johnstown, and they intimated that if the rates were not changed the matter would be taken before the Interstate Commissioners for settlement. The railroads, however, claim that they have not violated the Interstate law, since the law does not prohibit them from making the same rate for a long and short haul, but in no case are they allowed to make a lower rate for shorter than a longer one. The rates were made at the request of the Johnstown manufacturers. For points east of Johnstown the Pittsburgh manufacturers have been paying the same rates as the Johnstown manufacturers, and the new schedule was made in the endeavor to equalize the advantages of Pittsburgh over Johnstown on Eastern business.

### The Cost of Machine Coal Mining.

Prof. H. A. Wheeler, of Washington University, St. Louis, has contributed to the *School of Mines Quarterly* an article on machine mining in the St. Louis coal regions, from which we take the following estimate of the cost of mining with the Harrison machine (Heavy Standard pattern) for a plant of about 400 tons daily capacity, which is about the usual size of the shipping mines in the Belleville district. In making up such an estimate as this, of course, only general figures can be given that will have an average value; local conditions will more or less modify these for any particular plant, while different seasons will cause considerable fluctuations in the principal daily expense, the labor item. Attention is called to one item of cost that is so very frequently omitted in engineers' estimates—viz., the pro rata that must be charged each year to return, as a sinking fund, the capital invested in the complete original outlay, besides the annual outlay in repairs that is required to keep this first investment in use. For not only must interest be charged against this cash investment (whether purchased through loans, mortgage or out of the cash capital), but the principal must be returned by the time the plant is worn out, which, in this case, is assumed to be at the expiration of ten years, except the machines, whose mean length of service is put at six years. The plant investment required to maintain such an output, for which eight machines will be necessary, is assumed to be as follows:

#### Plant Investment for an 8-Inch Machine Mine.

Compressor: 1 Compound Norwalk, 20 in. by 24 in. steam cylinder	\$3,000
Erection and housing of compressor	1,500
Air-Receiver: 1 main receiver, 4½ ft. by 12 ft.	\$350
Air-Receiver: 8 entry receivers, 1½ ft. by 6 ft. @ \$90	720
Piping: 500 ft. 5 in. shaft piping @ 54 cents	\$270
Piping: 2,000 ft. 3 in. main-entry piping @ 28 cents	560
Piping: 10,000 ft. 2 in. cross-entry piping @ 13 cents	1,300
Piping: 5,000 ft. 1½ in. room-piping @ 10½ cents	525
Total	\$2,655
Erection	885
	\$2,655
Boilers: Two 50 horse-power boilers with complete fittings	2,000
Erection and housing of boilers	1,000
*10 Harrison Mining Machines, "Heavy Standard," including royalties, @ \$600	6,000
Hose: 8 pieces, 4-ply, rubber hose, 50 feet long, with couplings, @ \$40	320
Extra picks (8 @ \$3), Tools, &c.	300
Freight, incidental, &c.	1,296
Total	\$20,000

On this basis of an investment of \$20,000, which would be required to convert a hand mine into a machine mine (independent of all outlays for hoisting, pumping, ventilating and other machinery for general maintenance), the following estimate is made for the complete daily expenses of running a Harrison machine.

#### Running Expenses of a Machine per Day, with an 8-Machine Plant and 300 Working Days per Year.

	Cost.	Per cent. of whole.
Labor: 1 machine runner.. @ \$2.25		
1 machine helper..... @ 2.00		
1 blaster..... @ 2.25		
1 timberman..... @ 2.00		
4 loaders, @ \$1.75.....	7.00	
	\$15.50	77.6
Blacksmithing: 8 machine picks, @ 4 cents.....	\$0.32	
8 drill-augers, @ 1½ cents	0.12	
		0.44
Supplies: Powder, 10 lb @ 10 cents +.....	\$1.00	
Oil and packing.....	0.00	
	\$1.10	5.5
Repairs: On machine, daily pro rata \$60.00	\$0.20	
300 days		
Hose and piping, pro rata \$60.00		
300 days	\$0.40	2.0

Compressor: One engineer	\$2.25		
One-half fireman.....	0.88		
Six tons slack coal, @ 15 cents.....	0.90		
Repairs and supplies to compressor.....	1.00		
Repairs and supplies to boilers.....	0.50		
Total for the eight machines.....	5.50		
Expense for one machine	8	\$0.69	3.5
Interest on \$20,000, @ 10 per cent. per machine for 1-300 year.....		0.84	4.2
Sinking Fund:			
\$14,000, @ ten years per machine, for 1-300 year..	0.58		
\$6,000, @ six years per machine for 1-300 year....	0.42	1.00	5.0
Total.....	\$19.97	100.00	
* 8 for use, 2 as "extras" during repairs.			
† Including squibs and paper.			

On a tonnage of 50 tons per day per machine, this total expense of \$19.97 gives a rate of 39.94 cents, or, say, 40 cents per ton for undercutting, blasting and the labor of timbering and loading the coal on the mine cars, as against 50 cents a ton when this same work is done by hand miners. Where the seam is thin, or the coal poor in quality, less coal will be obtained from each machine, and as the expenses will remain about the same, it will make the rate higher; thus, on rooms that produce only 45 tons per day per machine, the rate per ton will be 44½ cents. The estimate is based on a year of 300 working days, which is the minimum that a mine should be worked to produce economically; but as the average working-year for the coal mines of Illinois in 1886 was 206 days, the cost of machine mining, when revised on a basis of 200 days of work for the whole year (to allow for shutting down during the dull season) is at the rate of 43.94 cents on the 50-ton basis, and 48½ cents on the 45-ton basis, as the total daily expense is raised to \$21.82. The sinking fund charge is 5 per cent., and the interest is 4.2 per cent. of the total daily expenses on the 300-day basis; but the former is increased to 7 per cent. and the latter to 5.7 per cent. when the plant only works 200 days in the year.

A popular figure for the cost of a Harrison machine per day for power, repairs, interest and depreciation is put at \$2.50, or 5 cents to 5.7 cents a ton. This is too low, as will be seen from the estimate (\$2.93), though large plants working full time and having the cutting done by contract could probably work very close to the 5-cent rate.

#### Triple-Expansion Pumping Engines.

On the opposite page we present an engraving of an entirely new type of pumping engine, built last year by Messrs. E. P. Allis & Co., of Milwaukee, Wis., for the Milwaukee Water Works, a high duty pumping plant. The engine is of the triple-expansion class, being the first one for this kind of work built in America, and at the present time it is the only one of its kind in operation. The duty guaranteed for this engine was 115,000,000 foot-pounds per 100 pounds of coal burned, and the steam pressure to be carried was to be limited to 80 pounds. This guarantee we understand was easily exceeded in the official test, though made under very unfavorable conditions. A duty of 125,000,000 foot-pounds per 100 pounds of coal has been attained under ordinary conditions, burning Anthracite coal of only fair quality, no deductions of any kind being made. This duty is equal to 1.15 pounds of coal, or about 13.56 pounds of water per indicated horse-power per hour. The arrangement of the engine is what is termed in marine practice "fore and aft" compound, with three cranks, set 120° apart.

The steam is supplied by ordinary cylindrical tubular boilers without any special setting. Each cylinder has two piston rods, which connect to a forged steel

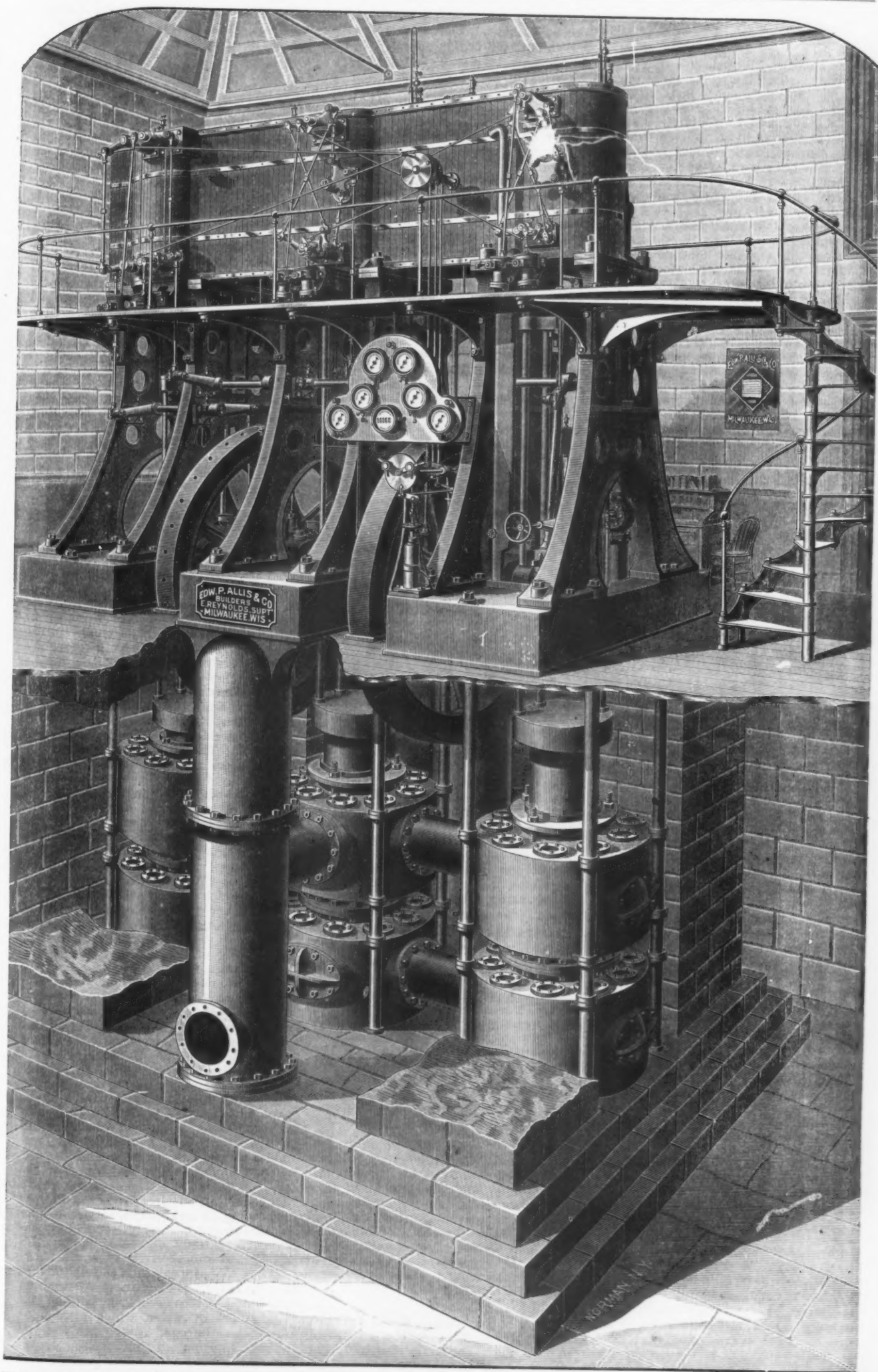
cross-head, connected directly to the pump plungers below by means of four distance rods, which straddle the crankshaft, so that the motion is transmitted directly from the steam pistons to the pump plungers without passing through journals of any description. The three steam cylinders are 20 inches, 35 inches and 40 inches respectively in diameter by 3 feet stroke, and are fitted with the Reynolds-Corliss valve gear, with independent, adjustable cut-off gear for each. They are jacketed and connected by large receivers, which also serve to tie the machines together rigidly. The bed plates of the high and low pressure engines stand on stone piers, while the center or intermediate one rests upon the tops of the suction and discharge air chambers. The entire machine is so accurately balanced and so self-contained that even when running far above the contract speed there is said to be no perceptible vibration.

The pumps shown in the engraving, beneath the floor of the engine room, are of the single-acting, outside-packed-plunger type, with double-beat Cornish valves, arranged in annular chambers, outside of the plunger barrels. The delivery of the pumps is so steady that they have been run a week at a time without any air in either of the air chambers and without the slightest shock upon the pipes or pumps. The nominal pumping capacity of the engine is 6,000,000 gallons in 24 hours against a head of 60 pounds, but it has been operated with a capacity of nearly 9,000,000 gallons without difficulty. It has done the entire work of the Milwaukee high service station for nearly a year and has never been stopped necessarily during that time, excepting for a few minutes at night in order to pack piston rods or valve stems.

Messrs. Allis & Co. are at present building five engines similar to the one illustrated for the new Chicago Water Works plant, which will have a nominal capacity of 15,000,000 gallons each against a head of 125 feet, but are guaranteed to deliver 18,000,000 gallons each per day without overloading. They are also building four triple-expansion pumping engines of a somewhat different style for the City Water Works of Albany, N. Y., which will have a daily capacity of 5,000,000 each, against a head of 310 feet.

Among the monster pumping engines in course of construction at the Allis Works especially worthy of notice is the plant for the City of Milwaukee, to be used for flushing the river which passes through the center of the city. The outfit is to deliver 350,000,000 gallons of water per 24 hours from Lake Michigan into the river, above the city.

The channel span of the new Chesapeake and Ohio railroad bridge in course of erection between Cincinnati and Covington, collapsed on Sunday morning with a tremendous crash. The disaster was caused by the accumulations of drift during the recent high water against the trestle or false-work of the bridge. The span which collapsed was 100 feet high, and on top of it was a "traveler." The structure was weighted with some freight cars loaded with pig iron and other heavy material, besides 700,000 pounds of bridge iron, to make it steady. The loss is estimated at \$90,000, and will fall on the Keystone Bridge Company, of Pittsburgh. A Cincinnati dispatch says: "Superintendent Milliken had exhausted all known resources to avoid the catastrophe. A large pile protector had been anchored above the span, with two lines of booms formed of coal barges, dividing the heavy masses of driftwood and sliding the bulk of it under the completed span on the south shore of the river or between the north-most pier and the Ohio shore, where the superstructure has not yet been begun."



TRIPLE-EXPANSION PUMPING ENGINES AT THE MILWAUKEE WATER WORKS, BUILT BY MESSRS. E. P. ALLIS & CO.

### The Cruiser Baltimore.

The cruiser Baltimore, which was launched on Tuesday last at the works of Messrs. William Cramp & Sons, at Philadelphia, is a steel twin-screw ship, fitted with a heavy steel protective deck. She has a length over all of 335 feet, while between perpendiculars she measures 20 feet less. She has a beam of 48 feet 6 inches and will draw 19 feet 6 inches with all her battery, stores, provisions and coal on board. This will give the vessel a displacement of 4400 tons. According to the contract requirements the Baltimore's engines must develop 7500 horse-power under natural draft, while with forced draft it is expected to bring the power up to 10,750, which gives the cruiser a maximum speed of 19 knots per hour.

The rudder and steam steering gear are placed below the water line, under the protective deck, worked from the chart-house and conning tower, so that in case a shot should strike the cruiser above the water line the steering gear of the vessel would escape uninjured. There are to be two masts fitted with military tops, but they

spaces by means of pipes, louveres and cowls. Artificial ventilation is also provided for all compartments below the living deck by means of two blowers of 10,000 cubic feet capacity per minute, so arranged as to exhaust from or force air to the several parts of the vessel, and to deliver it into the lower parts of the engine-room or the open air. A steam bilge pump has already been placed in each engine-room, with suction from the sea, the engine-room bilge, the ship's drainage system and the boilers each delivering into the fire main or overboard. The steam windlass, which is fitted on the forward gun deck, is worked by an independent engine. The main battery will consist of four 8-inch breech-loading rifles, mounted on the poop and forecastle decks, 26½ and 28 feet respectively above the water. Besides these there will be six 6-inch breech-loading rifles, mounted 18 feet above the water in sponsons, having a train of 155° from the line of the keel for the forward and after pairs and a train of 130° for the guns in the waist. The secondary battery consists of six 6-pounders, rapid-fire guns, six Hotchkiss revolving cannon and four Gatlings. Five above-water launching

Endurance of "Baltimore."

Speed.	I. H. P.	Coal.		Distance per day.	On normal supply of 400 tons.		On full bunker capacity, 850 tons.		P. Coal per I. H. P. per hour.
		Per hour.	Per day.		Distance can steam.	Days.	Distance can steam.	Days.	
Knots.		Tons.	Tons.	Knots.	Knots.		Knots.		Pounds.
19	10,000	9.82	235.68	456	771	1.69	1,637	3.50	2.20
18	8,100	5.79	138.96	432	1,244	2.88	2,644	6.12	1.60
17	6,600	4.71	113.04	408	1,444	3.54	3,068	7.52	1.60
16	5,250	3.30	77.20	384	1,939	5.05	4,120	10.73	1.60
15	4,250	3.00	72.00	360	2,002	5.56	4,255	11.81	1.60
14	3,450	2.46	59.04	336	2,275	6.77	4,834	14.39	1.60
13	2,800	2.00	48.00	312	2,599	8.33	5,522	17.70	1.60
12	2,250	1.61	38.57	288	2,886	10.02	6,132	21.29	1.60
11	1,750	1.25	30.00	264	3,480	13.33	7,395	28.32	1.60
10	1,400	1.03	25.02	240	3,838	15.99	8,155	33.98	1.65
9	1,100	.83	19.92	216	4,337	20.08	9,214	42.67	1.70
8	820	.65	15.60	192	4,905	25.60	10,445	54.40	1.80

will not be put in place until after the vessel has been launched and has all of her boilers and machinery in place. A large military top with bullet-proof armor will be erected on each masthead, fitted to hold modern machine guns of rapid fire. Hotchkiss revolving cannon or long-range single-barrel guns will be mounted here.

The coal supply of the new cruiser is 400 tons at her normal draft, while her bunker capacity is estimated at 850 tons. The Baltimore is intended to be a flagship, which will carry the commander-in-chief of the station to which the vessel may be attached. The engines are of the triple-expansion type, two in number, placed in separate water-tight compartments. The cylinders are 42, 60 and 94 inches in diameter, with 42-inch stroke. There are two three-bladed screws, 14 feet 6 inches in diameter. The boilers are ready in the shops now, and consist of four double-ended horizontal return tubular boilers, 14 feet 8 inches in diameter, each having at each end four corrugated furnaces 3 feet in diameter. Two electric plants of the most approved pattern, the lightest and most compact and best adapted for marine work, are ready to be placed aboard the vessel. The dynamos are each of 3200 candle-power, so constituted that lights 10, 16, 32 and 50 candle-power can be used on the same circuit, with an independent control over each lamp. All parts of the ship will be fully lighted by the incandescent lamps, including coal bunkers, magazines, shell and ammunition rooms, running lights and lights for use on the upper decks and aloft. Recourse is had to natural ventilation as much as possible for the living and storage

tubes or guns are fitted—two fixed tubes forward, firing directly ahead, and one fixed aft, and a training tube on each bow. An armored conning tower 3 inches thick is being fitted on the forecastle with a horizontal cover 1 inch thick, with openings in the sides for outlooks. Engine telegraphs, a steering-wheel, an indicator and speaking tubes are to be within the tower. The appended endurance table of the ship will prove of further interest.

We are in receipt of the report of the proceedings of the twenty-first annual convention of the American Railway Master Mechanics' Association, held last June, and need perhaps scarcely emphasize the fact that it is in all respects a highly instructive and interesting little volume. Those who have even superficially followed the work of the association are well aware of its valuable character and will find this latest report to meet all their expectations.

William P. C. Whitaker, an old iron-maker, died recently at his home in Harford County, Md. His father and uncle were pioneers in iron manufacturing in America, and operated furnaces at Reading, Pa., Bridgeton, N. J., Wilmington, Del., and various other places. He carried on the manufacturing long after his father died, having furnaces at Principio and Havre de Grace, Md.

The new Holly Water Works machinery at Port Huron, Mich., is about to be put in operation. The entire plant cost \$222,000.

### The Chicago Crucible Steel Casting Company.

A new plant has just been erected in Chicago for the manufacture of steel castings by the Chicago Crucible Steel Casting Company. Their old works, located at 1326 to 1330 Indiana avenue, proved to be too small for the demands made upon them, and they have been abandoned and the equipment has been removed to the new location. The site of the new works is near the Elston avenue crossing of the Chicago and Northwestern Railroad, a branch of which road runs alongside the main building. The location was selected mainly on account of the excellent facilities which this railroad company give their patrons. It is conveniently reached by the trains on the Milwaukee division, all of which going north are obliged to stop opposite the works before crossing a draw-bridge over the Chicago River. In addition to their railroad facilities the company have good dockage on the river, which is navigable to Lake Michigan. The ground owned by them comprises four acres. The main building is a substantial structure, built of hand-made brick with a slate roof, one story high, and 220 feet long by 80 feet wide. It contains four double crucible steel furnaces of 12 pots each, one 8-ton open-hearth steel furnace, and one 3-ton iron cupola, together with gas producers, recuperators, &c. The cupola is intended for the manufacture of flasks, &c., for the company's own use, but may also be put into service for the production of special iron castings of a high grade. It has a capacity of 20 tons in 12 hours. Space has been provided for two additional open-hearth furnaces or for crucible furnaces, to be erected as the necessities of the business may require them. Six heats can be made in the crucible furnaces and four in the open-hearth furnaces every 24 hours. The present melting capacity is about 43 tons in that time. The furnaces were designed and constructed by John Zellweger, of Chicago. The principle on which his gas furnaces are constructed is, as explained by him, "the recuperation of heat," which is accomplished by the transfer of heat to the air entering the furnace to promote combustion of the gas, this air being sufficiently heated to melt cast iron before it comes in contact with the gas. The molding floor contains 8500 square feet and is served by four cranes, which reach every part of it. There is one 16-ton crane, two are 6-ton and one is 3-ton. The furnaces, gas producers, coal heat form, &c., are arranged in the part of the building nearest the railroad track for the convenient handling of raw materials.

Small crucible castings are poured on a molding floor, consisting of an elevated iron platform, 146 feet long by 20 feet wide, arranged on a level with the top of the crucible furnaces. Under the platform are four large drying ovens to dry the molds. These ovens are operated by waste heat from the furnaces, and are thus kept uniformly hot without any expenditure for fuel. A railroad track runs in front of the ovens, connecting by turntables with branch tracks in various parts of the building, and on which iron trucks are run to move heavy castings with a minimum of labor. A second building, 100 feet by 50 feet, contains the remainder of the plant, consisting of drilling machines, a pattern shop and a blacksmith's shop. Patterns received from other parties are stored away from the main building, so as not to be in danger of fire from the furnaces. A large tank, holding 80,000 gallons of water, which is pumped from the Chicago River, provides an ample supply at all times for the necessities of the works. Power is furnished by

two 50 horse-power engines. The castings manufactured by this company at their old plant on Indiana avenue have achieved for them an excellent reputation. They are made under a process perfected by Dr. J. W. Chisholm and Wm. Chambers early in the present year, after many months of careful experiments. These castings are soft enough to work under any tool, have been tested up to 70,000 and 80,000 pounds tensile strain, are practically free from blow-holes. They can be delivered in two or three days after the patterns are received, annealing being done away with. The promptness with which the company can deliver work is a strong recommendation to consumers, while the high character of their castings seems to be established by the testimonials which they submit from those who have given them orders. Orders are now in hand for steel castings from many parts of the United States. The officers of the company are as follows: Dr. J. W. Chisholm, president; William Chambers, secretary; R. W. Rathbone, Jr., treasurer. They maintain a city office in the Rookery Building, on the corner of La Salle and Adams street.

## Wages in Iron Works.

The eager discussion now going on over every point involved in the questions affecting the tariff is bringing to us many inquiries concerning the wages paid in iron and steel works. Staggering statements are being made by those who would have the public believe that labor in our iron mills is poorly paid. No more striking illustration of this point, and of the great stupidity with which statistics have been perverted, has come to our notice than that of an article printed in the New York *World* of August 22d over the signature of T. E. Willson. This unknown manipulator of statistics has overhauled a number of industries, among them the manufacture of iron and steel, his guide being the census reports. He takes up in detail the blast furnaces, the bloomeries and forges, the rolling mills, Bessemer works, file makers and manufacturers of cutlery and edge tools. We need only dispose of the general table relating to iron and steel to show the methods employed. We quote:

The following table of wages paid in the States will be found on page 1136 of the census:

State.	No. shops.	Average No. workers.	Total wages.	Average yearly wages.	Average weekly wages.
Alabama.....	14	1,626	\$571,713	\$351	\$6.75
California.....	1	319	177,722	556	10.69
Colorado.....	1	125	7,000	56	1.07
Connecticut.....	19	685	331,184	484	9.31
Delaware.....	9	867	344,476	397	7.63
District Columbia.	1	18	7,527	418	8.14
Georgia.....	14	1,303	185,489	142	2.73
Illinois.....	21	5,253	2,508,718	477	9.17
Indiana.....	12	2,048	864,921	422	8.11
Kansas.....	2	630	166,500	264	5.08
Kentucky.....	29	4,065	1,344,500	326	6.27
Maine.....	3	700	141,404	202	3.88
Maryland.....	23	2,763	905,090	327	6.29
Massachusetts.....	30	6,513	2,576,539	395	7.50
Michigan.....	33	3,089	922,597	298	5.73
Missouri.....	22	3,139	734,575	234	4.50
Nebraska.....	1	100	50,000	500	9.61
New Hampshire.....	2	290	127,690	440	8.46
New Jersey.....	49	4,762	1,808,448	377	7.25
New York.....	89	11,444	4,069,451	358	6.88
North Carolina.....	20	63	7,907	126	2.42
Ohio.....	134	20,071	8,265,070	412	7.92
Oregon.....	1	250	46,822	187	3.59
Pennsylvania.....	366	57,952	25,065,850	433	8.32
Rhode Island.....	3	275	130,969	476	9.15
Tennessee.....	43	3,077	659,773	214	4.11
Texas.....	1	140	27,720	198	3.81
Vermont.....	4	191	50,035	262	5.04
Virginia.....	44	2,522	665,432	264	5.08
West Virginia.....	20	4,121	1,541,816	374	7.19
Wisconsin.....	9	2,153	1,004,931	467	8.98
Wyoming.....	1	184	79,650	433	8.32

Protection cannot prevent the wages paid in California, Connecticut, Illinois or Indiana from falling to the level paid in New York, nor the wages paid in New York and Pennsylvania from falling to the wages paid in Tennessee or Missouri. Are the latter high wages?

How can the bulwark of protection protect the Northern workman from the pauper wages of Georgia, North Carolina and Tennessee? It has not protected the workmen in Southern States from a reduction to foreign pauper wages. The Northern mechanic must look to something besides protection to keep his wages at their present level.

The first three columns are a correct reproduction of the census statistics; the last two have been computed by the eminent statistician who is their author by the simple expedient of dividing the total wages by the number of workers to get the yearly wages, and dividing the latter by 52 to reach the average weekly wages. The result ought to have struck even the editor of the *World* as amazing. In Colorado, where wages are high, the wretched ironworkers are content with \$56 a year, or \$1.07 a week. In Georgia their weekly compensation figures out \$2.73, and in North Carolina \$2.42. A moment's reflection would have taught Statistician Willson that the works making returns may have been in operation for only a fraction of the year. The same stupendous blunder runs throughout the whole article, and is all the more inexcusable because Mr. James M. Swank, the highest statistical authority in this country, has in his special census report furnished in detail the very data which Mr. Willson tried to get at in the ridiculous manner alluded to. We quote from page 47 of his report as special agent of the census:

### Wages and Hours of Labor.

State.	Average No. of hours per w.k.	Average day's wages, skilled mechanic.	Average day's wages, ordinary labor.
Alabama.....	74	\$2.27	\$1.14
California.....	60	3.00	1.75
Colorado.....	60	4.00	1.75
Connecticut.....	64	2.74	1.27
Delaware.....	56	2.40	1.17
Georgia.....	62	2.19	.85
Illinois.....	63	3.43	1.27
Indiana.....	67	3.21	1.23
Kansas.....	56	3.00	1.25
Kentucky.....	69	2.73	1.13
Maine.....	65	2.47	1.15
Maryland.....	72	1.90	.96
Massachusetts.....	60	2.71	1.27
Michigan.....	70	1.92	1.25
Minnesota.....	60	2.00	1.50
Missouri.....	69	2.74	1.27
Nebraska.....	60	3.00	1.50
New Hampshire.....	57	2.00	1.19
New Jersey.....	63	2.32	1.21
New York.....	68	2.43	1.18
North Carolina.....	73	1.25	.54
Ohio.....	66	2.89	1.30
Oregon.....	72	3.00	1.50
Pennsylvania.....	66	2.32	1.13
Rhode Island.....	60	4.00	1.17
Tennessee.....	67	1.62	.88
Texas.....	60	2.00	1.00
Vermont.....	75	3.30	1.28
Virginia.....	61	1.73	.80
West Virginia.....	66	2.26	1.10
Wisconsin.....	74	2.07	1.19
District of Columbia.....	54	2.50	1.62
Wyoming.....	60	4.00	2.00
Average.....	65	2.50	1.24

If further confirmation were needed we need only point to the figures collected by A. S. Bolles, chief of the Bureau of Statistics of Pennsylvania, and published in the annual report for the year 1887. These figures, besides, have the merit of being more recent, though, of course, they cover individual cases only.

### Wages in a Pennsylvania Iron Works, 1887.

Hours.	Rate per hour.	Total earnings.	Per cent. wages paid each class.
462,250.....	0.090	\$41,634.61	2.6
6,938,790.....	0.140	969,737.09	60.2
1,469,300.....	0.228	349,950.00	21.7
553,040.....	0.451	249,508.78	15.5
9,423,420.....	0.171	\$1,610,890.57	.....

Mr. Bolles has, at the suggestion of the works, grouped the workmen according to their wages per hour into four divisions, the first including all who receive from 5 to 12 cents an hour inclusive, the second receive 12 to 20 cents, the third 20 to 33 cents, and the fourth class includes all

who are paid 33 to 65 cents an hour. The day is one of 10 hours throughout. Tabulated thus the employees stand as follows:

First classification.		Second classification.	
Per cent.	Received per day.	Per cent.	Received per day.
3.3	\$0.50	40.7	\$1.20
0.4	.61½	0.8	1.25
3.8	.70	13.9	1.30
15.2	.75	5.6	1.35
12.1	.80	4.5	1.40
2.2	.85	2.6	1.45
12.1	.90	2.7	1.50
34.1	1.00	3.9	1.55
6.7	1.05	2.3	1.60
4.3	1.10	1.5	1.65
5.6	1.16	1.6	1.70
.....	.....	3.3	1.75
.....	.....	3.0	1.80
.....	.....	4.5	1.85
.....	.....	1.6	1.90
.....	.....	2.0	1.95
.....	.....	0.5	1.97

Third classification.		Fourth classification.	
Per cent.	Received per day.	Per cent.	Received per day.
17.1	\$2.00	16.5	\$3.10
10.8	2.03	7.2	3.25
2.3	2.10	5.6	3.33
6.0	2.15	5.1	3.42
4.9	2.20	1.4	3.50
5.7	2.25	0.9	3.58
1.8	2.30	1.2	3.80
5.6	2.35	9.4	3.92
1.6	2.40	2.1	4.01
4.1	2.45	1.4	4.23
7.7	2.50	21.2	4.29
1.2	2.55	0.9	4.60
2.2	2.65	1.5	4.70
2.3	2.70	2.3	4.90
1.1	2.75	3.4	5.03
1.3	2.79	5.2	5.35
3.8	2.87	0.8	5.50
1.7	2.93	3.2	5.80
3.4	3.00	0.7	5.95
1.8	3.06	4.2	6.21
1.5	3.10	12.3	6.42
2.0	3.20	5	6.47
4.7	3.28	.....	.....

### WAGES IN A LARGE PENNSYLVANIA MILL.

Another large works have prepared the following statistics, which we have tabulated:

	Number employed.	Average number of days employed.	Wages per day.	Average earnings per year.	Average earnings three best men.
Puddlers.....	323	261	\$3.50	\$913.55	\$930.06
Muck rollers.....	4	261	8.83	2,303.73	.....
Muck weighers, shearmen and day hands about forge ..	118	292	1.73	506.77	.....
Scrapers.....	12	249	4.11	1,024.16	.....
Bottom furnace heaters.....	4	239	5.08	1,214.39	.....
Blacksmiths.....	26	364	2.75	726.00	844.80
Blacksmiths' helpers.....	26	264	1.65	435.00	.....
Millwrights.....	15	310	2.75	824.51*	1,059.11
Bolt, rivet and spike makers.	15	309	3.70	1,144.36	1,445.29
Bolt department, miscellaneous hands	32	309	2.22	687.25	851.05
Boys in bolt department.....	30	309	.82	265.97	327.35
Chainmakers.....	38	308	2.50	770.00	986.63
Miscellaneous workmen, chain factory.	19	308	1.96	603.68	657.06
Furnace boys, chain factory.	34	308	.60	184.80	200.03
Machinists.....	127	306	2.70	828.12	1,061.80
Apprentices, machine shop.	7	306	.83	324.94	.....
Machine shop laborers.....	17	306	1.57	481.95	.....
Molders in foundry.....	60	307	2.78	853.66	1,185.15
Apprentices in foundry.....	15	307	.97	290.39	.....
Laborers in foundry.....	29	307	1.50	542.16	.....
Bricklayers.....	10	309	3.80	1,174.20	1,528.56
Bricklayers' helpers.....	11	309	1.70	543.84	684.61
Pattern-makers	11	302	2.52	763.78	953.97
Pattern-makers' apprentices.....	4	302	.89	268.08	300.00
Carpenters.....	15	301	2.52	758.65	943.38
Engineers.....	24	307	3.16	969.79	1,116.09
Spool-engine boys.....	13	307	1.33	409.41	.....
Miscellaneous workmen.....	283	282	1.40	394.80	483.75
Pull up boys.....	36	211	.65	137.15	.....
Laborers in rolling mill.....	302	.....	1.35	442.38*	526.50
Extra laborers in rolling mill.	47	303	1.69	513.58	606.74

Stockers.....	37	309	1.55	711.86*	611.89	Roller, 12-inch bar mill.....	1	252	11.41	2,875.32	Roughers.....	2	4.12	1,010.68
Teamsters.....	6	308	1.88	579.04		Assistant roller (paid by roller), 12-inch bar mill.....	1	252	4.76	1,199.52	Hookers.....	10	3.12	765.67
Watchman and furnace firemen.....	13	305	1.96	598.54	730.00	Heaters (paid by roller).....	6	252	4.44	1,118.88	Shearman.....	2	4.12	1,010.68
Railroad-track layers.....	14	301	1.69	510.13		Catchers (paid by roller).....	2	252	4.78	1,204.56	Shearman helpers.....	2	2.77	679.35
Heaters, 16-inch bar mill, new mill.....	6	147	7.33	1,077.51		Roughers (paid by roller).....	8	252	2.62	660.24	Shearman buggyman.....	2	2.04	501.16
Finishers and roughers, bar mill.....	5	147	3.02	433.93		Piler, charger, drag-out, hook-up, straightener, shearman and helper.....	16	252	2.33	587.16	Heaters.....	4	5.50	1,347.57
Rollers, bar mill.....	1	147	18.02	2,648.94		Roller, net earnings, 16-inch bar mill (re-modeled, part idle).....	1	232	9.29	2,255.28	Bottom-makers.....	2	3.40	835.27
Assistant roller, bar mill.....	1	147	7.85	1,153.95		Assistant roller, net earnings, 16-inch bar mill.....	1	232	5.01	1,162.32	Bottom-makers' helpers.....	2	2.27	556.85
Heaters and helpers, bar mill.....	6	147	2.77	407.19		Roughers and finishers, net earnings, 16-inch bar mill.....	5	232	2.76	640.32	Chargers.....	6	3.07	751.74
Catchers, bar mill.....	2	147	6.52	958.44		Catchers, net earnings, 16-inch bar mill.....	2	232	4.16	956.12	Covermen.....	2	1.70	417.63
Catchers' roughers, bar mill.....	4	147	3.61	530.67		Catchers' roughers, net earnings, 16-inch bar mill.....	4	232	2.31	535.93	Regulators.....	2	2.07	506.73
Pilers, chargers, hoop-up's, straighteners, shearman and helpers.....	10	147	3.78	555.66		Heaters, net earnings, 16-inch bar mill.....	6	232	4.68	1,085.76	Rack boys.....	2	1.70	417.63
Bridgeworks, skilled laborers.....	74	308	2.17	667.78	978.60	Heater, helper, piler, drag-down, hook-up, straightener, shearman and helper.....	8	232	2.43	563.76	Heater helpers.....	2	3.40	835.27
Laborers, bridge works.....	39	308	1.45	482.22*		Roller at sheet mill, net.....	2	183	6.69	1,224.27	Chargers.....	6	2.77	679.35
Boys, bridge-works.....	7	308	.85	262.82		Heaters, sheet mill.....	2	183	5.08	929.64	Blowing engineers.....	2	2.75	685.00
Rollers, 18-inch mill (pay's help).....	1	261	2.18	5,705.30		Rollers, plate mill, net.....	2	204	7.35	1,490.40	Reversing engineers.....	2	3.25	975.00
Roughers, 18-inch mill (no help).....	8	261	4.67	1,219.38		Heaters, plate mill.....	2	204	5.61	1,144.44	Fan engineers.....	2	2.20	560.00
Catchers, 18-inch mill (no help).....	2	261	9.47	2,471.67		Catchers and roughers, plate mill.....	4	204	2.50	510.00	Small locomotive engineers.....	2	1.20	300.00
Catchers' helpers, 18-inch mill (no help).....	4	261	4.37	1,140.98		Nailers.....	21	276	3.78	1,403.80	Laborers.....	106	1.62	486.00
Heaters, 18-inch mill (no help).....	6	261	9.95	2,598.04		Nailfeeders, boys.....	71	276	1.12	308.73	Millwrights.....	3	3.90	1,170.00
Heaters' helpers, 18-inch mill (no help).....	6	261	3.84	1,002.10		Rollers, nail mill.....	2	196	6.83	1,319.16	Boys from 62½ cents to \$1 per day.....	20		
Piler, charger, drag-down, hookers, straighteners, shearman.....	32	261	3.63	947.43		Catchers, nail mill.....	2	196	3.41	609.58	Total.....	282		
Rollers, small mills, 8 and 9 inch trains (no help).....	5	230	11.66	2,681.80	3,055.33 (1 man.)	Heaters, nail mill.....	4	196	4.82	960.13				
Assistant rollers, small mills, 8 and 9 inch trains.....	5	230	5.31	1,221.30	1,308.12 (1 man.)	Roughers, nail mill.....	2	196	2.00	386.00				
Heaters, small mills, 8 and 9 inch trains.....	10	230	6.63	1,524.90	1,638.00 (1 man.)									
Roughers, small mills, 8 and 9 inch trains.....	20	230	3.31	762.45	819.00 (1 man.)									
Drag-downs, small mills, 8 and 9 inch trains.....	10	230	2.00	460.00	477.00 (1 man.)									
Boys, straighteners, scrapers, poke-in.....	40	230	1.20	276.00	285.60									
Rollers, small mill, 10 inch (new, single turn).....	1	270	12.50	3,375.00										
Assistant roller, small mill, 10 inch, (new single turn).....	1	270	9.54	2,575.80										
Heaters, small mill, 10 inch (new, single turn).....	2	270	5.96	1,609.20										
Roughers, small mill, 10 inch (new, single turn).....	3	270	2.98	804.60										
Boy scrapers, poke-in and straighteners, small mill, 10 inch (new, single turn).....	4	270	1.20	324.00										
Drag-downs, small mill, 10 inch (new, single turn).....	2	270	2.70	629.00										
Roller, 12-inch bar train (new mill).....	1	179	14.95	2,676.05										
Assistant roller, 12-inch bar train (new mill).....	1	179	5.81	1,039.99										
Heaters, 12-inch bar train (new mill).....	6	179	5.42	970.18										
Catchers, 12-inch bar train (new mill).....	2	179	4.74	848.46										
Roughers, 12-inch bar train (new mill).....	8	179	3.19	571.01										
Pilers, chargers, drag-downs, loop-ups, straighteners, helpers and shearers, 12-inch bar train (new mill).....	16	179	2.84	508.06										

In considering the earnings of the men for the year it should be taken into account that the 16-inch bar mill was in operation only 147 days, being a new mill, that the 10-inch train is also now worked only single turn, and that only for a part of the year, the full year being 306 turns, and also that the 16-inch bar mill was re-modeled, and was therefore running only during a part of the year.

#### WAGES IN BESSEMER STEEL MILLS.

Below we reproduce a table given in the report of Mr. A. S. Bolles, the mill A having run 245 turns during the year. All the men work on a tonnage basis, except those marked with an asterisk:

Mill A—245 turns.			
Occupation or Kind of Workmen.	Number.	Average wages per day.	Earnings for each man for year.
Metal wheelers.....	12	\$2.47	\$606.90
Coke wheelers.....	4	2.24	549.45
Hoist boys.....	1	1.76	431.51
Cupola foreman.....	4	4.47	1,096.04
Cupola foremen helpers.....	12	2.93	719.18
Ferromen.....	4	2.19	537.95
Cinder men.....	4	2.19	537.95
Vessel foreman.....	4	2.34	575.35
Vessel foreman helpers.....	4	4.38	1,075.90
Scrapers.....	4	2.93	719.18
Vessel cinder men.....	4	2.03	497.68
Steel pourers.....	4	2.68	653.02
Pitmen.....	14	3.38	827.37
Sanders.....	14	3.54	857.27
Stopper setters.....	3	3.53	817.00
First regulators.....	2	2.66	653.02
Second regulators.....	2	2.03	497.68
Ladle liners.....	4	3.28	805.49
Ladle liners' helpers.....	4	2.72	667.40
Pushermen.....	4	2.34	575.35
Bottom-maker.....	1	3.40	834.25
Bottom-maker helper.....	1	2.77	678.91
Stopper-maker.....	1	2.93	719.18
Pipe-fitter.....	1	2.93	719.18
Pipe-fitter helper.....	1	1.76	431.51
Rollers.....	2	5.50	1,347.57

Mill B is another large Pennsylvania works, the figures being for the Bessemer and blooming mill departments of the establishment:

#### Mill B, Converting Department, 304 Turns.

Occupation.	Number.	Average daily wages.	Yearly earnings.
Metal wheelers.....	9	\$1.92	\$588.65
Vessel hands.....	6	4.29	1,318.19
Pitmen.....	21	3.56	1,094.31
Ladle hands.....	9	3.55	1,089.96
Metal wheelers.....	23	3.16	986.75
Metal cupola hands.....	15	3.40	1,045.64
Trough hands.....	9	3.11	953.64
Spiegel cupola hands.....	9	2.92	886.67
Coke fillers.....	6	2.06	634.24
Hoistmen.....	3	2.11	649.69
Cupola hands.....	3	1.89	581.29
Cinder men.....	15	3.13	961.96
Pulpit hands.....	6	2.50	766.93
Blowers.....	6	4.42	1,357.37
Stock weighmen.....	3	3.95	1,212.32
Bottom makers, No. 1.....	3	3.41	1,046.28
Bottom makers, No. 2.....	1	1.97	606.16
Cupola repairmen.....	2	2.71	832.80
Stopper maker.....	1	3.02	928.50
Cupola cinder men.....	3	1.70	520.78
Metal gang.....	6	1.92	588.41
Engineers.....	2	2.95	906.30
Assistant engineers.....	4	1.49	456.48
Water tenders.....	6	2.70	828.25
Laborers (325 days).....	43	1.20	389.30
Ganister mixers (324 days).....	8	1.00	434.04
Second-class laborers.....	14	1.00	324.00

#### Mill B, Blooming Department, 307 Turns.

Occupation.	Number.	Average daily wages.	Yearly earnings.
Heaters.....	3	\$4.00	\$1,309.27
Heaters' helpers.....	30	3.53	1,073.48
Chippers.....	4	3.87	1,181.41
Screwsman.....	3	3.77	1,146.62
Front tablemen.....	3	3.67	1,121.14
Engineers at rolls.....	3	3.00	910.06
Inspectors.....	3	2.86	869.21
Back tablemen.....	3	2.76	839.70
Seamen, bookers, telegraphers and loaders.....	18	2.62	796.63
Pull-abouts.....	6	2.52	766.30
Markers.....	3	2.48	752.76
Water tenders.....	6	2.70	828.25
Furnace bottomers.....	4	1.80	630.24
Day laborers.....	18	1.20	382.56

This enumeration does not include foremen. The wages paid in the rail mill of the same works are given in the following table, which we have compiled from the same source.

#### WAGES IN A STEEL RAIL MILL, ON TONNAGE BASIS.

No. employed.	Number days employed.	Average daily wages.	Yearly earnings.
Stockers.....	10	\$1.71	\$405.42
Heaters.....	20	4.22	908.48
Extra helpers.....	20	2.40	568.44
Sawyer.....	1	2.37	1,082.55
Sawyer's assistant.....	1	2.25	643.25
Buggymen.....	8	2.38	504.02
Roughers.....	4	3.44	815.70
Hookers and catchers.....	12	3.24	777.53
Cold straighteners.....	8	3.95	927.83
Gaggers.....	8	2.29	543.23
Hot straighteners.....	10	1.15	510.29
Levermen.....	12	1.15	511.23
Rail markers.....	2	1.88	682.86
Assistant rail markers.....	2	2.40	582.89
Chippers.....	2	2.22	532.69
Telegraphers.....	12	2.40	590.00
Rail run-outs and pull-ups.....	18	2.40	588.44
Rail run-outs.....	20	2.44	588.00
Greasers.....	2	2.79	418.75

Rail drag-out boys..	6	237	1.05	248.70
Inspectors.....	2	237	1.93	457.30
Assistant inspectors, boys.....	2	217	.80	173.02
Rail catchers for drillers.....	13	238	1.52	361.80
Engineers.....	2	232	1.75	455.50
Engineers.....	2	272	1.70	462.39
First-class laborers..	120	302	1.20	362.35

A glance along the columns of figures presented, covering, as they do, a wide field in iron and steel manufacturing, should be sufficient to prove that while the average wages paid in iron works are high, there are, in every mill, a number of positions which are unusually remunerative. The proportion of skill and labor is very large, indeed. Any one familiar with the wages question in American iron works knows that the examples chosen are not exceptional; that with fairly steady employment the earnings in the mills are large, compared with the sums earned in other industries.

## THE WEEK.

There are 200 cases of lead poisoning in Newark, N. J., of which 20 are in St. Michael's Hospital. The prevalence of the disease is attributed to the use of beer drawn through lead pipes and "soft" drinks from bottles rinsed with shot.

A bridge-building firm in Philadelphia have received orders for structural iron amounting to over \$250,000 from the New Jersey Central. This is to replace the iron bridges on the line east of Bound Brook and on the Newark branch. The material is now being delivered.

The business sentiment of Chicago is reflected by the *Tribune*, of that city, which says: "The wealth of the Northwest has been increasing enormously for years past. Even during the period when the price of wheat was so low and many people demonstrated to their own satisfaction that the farmers were losing money, the buying power of the masses somehow grew greater and greater. How much more rapid will be the progress with wheat 10 or 15 per cent. higher, an abundant yield of corn and other agricultural products at least fully up to the average. It is in Chicago that the richest bloom of this prosperity will be seen. This city is the central point of exchange for the best parts of the West. The wheat of Dakota, the corn of Nebraska and the cattle of Wyoming will soon be converted into bank deposits, buildings and railroad tracks in and around Chicago. Every week sees the inception of some new enterprise of general importance in this city, and the early fall will witness an unwonted activity in pushing those schemes."

The large paper mill of Geo. A. Whiting, of Neenah, Wis., caught fire in the boiler room, and while the flames were in progress the iron bleach, filled with steam and rags, exploded when the cold water from the fire engines struck it, and 14 persons were killed by the fragments which were thrown in every direction.

The extensive chemical works at Bushwick, L. I., Buffalo, N. Y., and Bayonne, N. J., owned by Martin Kalbfleisch's Sons, will be sold by the receiver of that firm some time in October. The disagreements of the firm respecting the manner of doing business are the cause of the dissolution. In the days of the ex-mayor the property was worth several millions.

The approaching completion of the Mexican National Railroad line from Corpus Christi, in Texas, to the City of Mexico, a distance of 1205 miles, will signalize the opening of the second great line of transportation between the United States and the neighboring republic. From the main line there will be branches to the great mining region around Zacatecas and

other branches to Monterey, Salvatierra and Tlascala. A line is now also building by the construction company from Manzanillo, the first harbor on the Pacific Coast of old Mexico, thus initiating a through line to Corpus Christi. Guaymas, in Sonora and on the Gulf of California, is a fine harbor further north, but to reach it vessels from San Francisco are compelled to round Cape San Lucas, the southern point of Lower California, and then sail half up the gulf before Guaymas is reached. But Manzanillo is a magnificent harbor, and directly in the course of the San Francisco vessels. Another result promised is the opening of a fine harbor at Asonzas, on the Texas coast, where deep water is much needed.

The process of laying a submarine pipe in St. Louis Bay, parallel with the Northern Pacific Bridge, is described by the *Superior Inter-Ocean*: "The pipe, which is jointed on shore into sections sometimes 100 feet in length, is swung in a cradle made of barrels, and is then towed to the side of the scow, upon which the men and machinery are. The pipe is gotten in line, and the tackle blocks attached. The pipe is allowed to sink gradually by cutting the barrels at such places as will let the pipes descend in a horizontal position." About 1000 feet have been laid, and the work proceeds at the rate of 240 feet a day. Divers follow the pipe to the bottom in submarine armor, taking along tools necessary to complete the coupling, which is a device covered by patents.

The annual statement of the business of the Boston Post Office for the fiscal year ending June 30, 1888, shows that gross receipts were \$1,730,377 against \$1,657,273 last year; balance in favor of the Government, after defraying expenses, is \$1,047,000.

Determined action will be taken by the various labor unions to secure the repeal of the conspiracy laws of the State of New York. With this object a call has been issued for a conference of all the trade representatives at Troy, on September 17. As stated by the Central Labor Union the situation is as follows: "Our highest courts have decided that under the present laws it is a crime to organize for the purpose of shortening the hours of labor, regulating the employment of apprentices and that until those laws are repealed any of us may be sent to a felon's cell for refusing to work with a person who is objectionable to us, and that we cannot take united action in refusing to purchase the goods of an unfair employer—in short, we cannot combine for any purpose except that of maintaining or raising wages. Some of our most active members are now under indictment and liable at any time to be sent to jail for exercising what we have always considered to be our rights as men and American citizens."

All attempts to manufacture sorghum sugar profitably in this country are pronounced a failure. Prof. H. W. Wiley, the chemist of the Department of Agriculture, has just published a bulletin of the Chemical Division of the Department of Agriculture, giving, in a condensed form, all the important recorded analyses of sorghum, an abstract of recorded tonnage per acre of sorghum, yield of sugar per ton and other data concerning the merits of sorghum as a sugar-producing plant, and the conclusion reached is that the only hope for sorghum is in the production of a better raw material.

Emancipation in Brazil, as was to have been expected, seriously disconcerts the operations of coffee planters, who suddenly find themselves embarrassed by the absence of available labor and a lack of ready cash wherewith to liquidate the pay roll. A letter from Saostas says the receipts of

coffee have been delayed by the want of hands on the plantations, the freedmen being "independent and lazy." Hands are wanted everywhere to mill the coffee.

Yellow fever in Jacksonville is gradually extending. A sanitary inspection of all trains from the South has been ordered before they are permitted to enter Washington, and arrangements have been made by which a special train will run between Jacksonville and Camp Perry, the refuge station in Florida.

The State Prison superintendent is disposing of the large amounts of raw material left on hand in the shops at Albany when prison labor was stopped, and storing away the machinery. No requisitions have yet been secured for convict goods.

The total imports into China in 1887 were valued at \$127,830,000, as against \$109,345,000 in 1886, an increase of \$18,485,000. The larger part of this increase is of cotton yarn and piece goods, mostly from England. Copper and opium imports also showed important increases. A heavy decrease was shown in the imports of refined petroleum. The total imports of this product were only 12,015,000 gallons in 1887, against 23,038,000 gallons in 1886. The total exports in 1887 were valued at \$107,325,000, an increase of over 11 per cent. on the preceding year. Tea, the only important export showing a decrease, fell off 5 per cent. in the quantity and 12 per cent. in the value exported. The exports of silk showed an important increase.

San Francisco papers notice the beginnings of the fall trade in all directions, and indications are considered very promising. "Our foreign imports to date," says the *Commercial Herald*, "exceed those of 1887 by about 22 per cent., the figures being \$30,549,504 for this year and \$25,051,646 for 1887. This in itself is a most convincing testimony of our increase in population and trade. Of a similar character is the result of the assessment of property throughout the State. The total assessed value of property for 1887 was \$908,119,480; for the present year it is \$1,083,333,328; showing an increase of \$175,213,848, or over 18 per cent."

A letter from Chicago says: "There is reported to be intense rivalry between two syndicates, each of which is anxious to have the credit of owning the highest commercial structure in Chicago. One of them started out to construct a 12-story building at Madison and La Salle streets. Then the Chamber of Commerce people decided to raise their roof to the height of 13 stories, and now the first-named party is said to have decided on 15 stories."

Engineer-in-Chief Melville, of the Navy Department, who went to sea on a six-hours' speed trial trip of the *Svatar* when she started for Brazil a week ago, reports that the engines worked exceedingly well, developing 1330 horse-power at one time, with 6½ revolutions per minute of the screw. This is a greater power than was expected, but it could not be kept up until the firemen have greater experience with their work at forced draft.

The bill for the erection of an appraiser's warehouse in the city of New York, as finally sent to the President for his signature, provides for the purchase of a site at a limit of \$850,000 and the erection of a building at a cost not exceeding \$650,000. The Secretary of the Treasury is given discretion to purchase a site large enough to embrace a custom-house building as well as an appraiser's warehouse or to purchase two sites near each other for the two purposes. In this contingency the Secretary is authorized to pay \$2,000,000 for the site. It was estimated that the site of the present Custom-House could be sold for \$3,000,000.

## MANUFACTURING.

### Iron and Steel.

No. 6 furnace, of the Crane Iron Company, at Catasauqua, Pa., has been blown out for repairs.

The Bethlehem Iron Company, at Bethlehem, Pa., are testing the direct process of hauling the molten pig from the furnaces to the converters, and avoiding melting in the cupolas.

Among recent building permits issued at Cleveland, Ohio, were the following: Cleveland Rolling Mill Company, wire warehouse, \$8000; Otis Iron and Steel Company, new building, \$10,000.

It is reliably reported that the Jackson Iron Company, of Cleveland, Ohio, have definitely decided to remove their furnaces from Fayette, Mich., to some point where the difficulty in obtaining fuel will not be so great. As the company's ore mines are located at Negaunee, Mich., it is the impression that the furnaces will be removed to that point, although the matter has not been definitely settled as yet.

The Richardson Axle and Wheel Company, of Covington, Ky., have been chartered by B. F. Richardson, H. B. Lupton and others, with a capital of \$200,000.

Robert Walker, receiver of the Himrod Furnace Company, has leased the Himrod Furnace to the Mahoning Valley Iron Company, of Youngstown, who have taken possession of the property. The furnace is in fair shape, and, it is expected, will be put in blast this week. The lease is for only three months, the company using the product in their mills until their own furnace, the Hannah, now being rebuilt, is ready for operation.

In reference to the recent cessation of operations at the plant of the Penn Iron Company, Limited, at Lancaster, Pa., we have received the following advice from the company, under date of the 20th inst.: "Our works shut down its puddling department last week because the workmen refused to come out to work when called. We discharged them all and shut down the puddle mill for needed alterations. We are running the finishing mills as usual, and will start up the puddle mill when ready. The trouble with the men was because of certain discharges of some of their number that had previously been made for their inefficiency."

The report recently published that the cold die rolled steel department of the works of the Hartman Steel Company, Limited, at Beaver Falls, Pa., had been closed down on account of a lack of orders is without foundation. That department is in full operation with a fair amount of orders on hand.

The Ohio Valley Foundry Company, of Bellaire, Ohio, built a large addition to their works last year and are now considering the advisability of adding another building, which will almost double their present capacity and give employment to a large number of additional workmen.

The Lawrence Furnace Company, of Ironton, Ohio, propose to build a 30-ton furnace in the vicinity of their present idle charcoal furnace at Culbertson, Lawrence County.

Emma Furnace, of the Union Rolling Mill Company, at Cleveland, Ohio, which has been out of blast for some time undergoing repairs, was blown in again on Wednesday, the 22d inst.

The well-known firm of Hussey, Howe & Co., Limited, steel manufacturers, at Pittsburgh, have been changed to Howe, Brown & Co., Limited. No change in

the manufacturing departments will be made, and the general business will be conducted by the new firm in all its branches, as heretofore. The officers of the new firm are Jas. W. Brown, chairman; W. R. Howe, vice-chairman; G. A. Howe, secretary; T. H. Childs, treasurer. The interests of C. G. Hussey and the estate of his son, C. G. Hussey, have been sold to the other owners.

The Twenty-ninth Street Iron Works, of Carnegie, Phipps & Co., Limited, at Pittsburgh, which have been shut down for some time owing to the fact that a new foundation had to be put in, will resume within the next week. The new foundation was completed last week.

The Reeves Iron Company, of Canal Dover, Ala., signed the Amalgamated scale last week, and have resumed operations. The concern is a small one, giving employment to about 100 men.

Keel Ridge Furnace, of P. L. Kimberly & Co., Limited, at Sharon, Pa., has resumed operations after an idleness of some weeks for repairs.

The Whitaker Iron Company, of Wheeling, W. Va., signed the amalgamated scale last week and operations have been resumed. The firm manufactures sheet iron exclusively.

The Ella Furnace, at Middlesex, Pa., has been blown out and is being repaired. A new and much-improved hot blast is being erected, and a new 87-inch cylinder upright blowing engine will be placed in position and will take the place of the present engines. The Ella was built for a 90-ton per day furnace, but has frequently made from 120 to 128 tons per day.

The Henderson Steel and Mfg. Company, of Birmingham, have increased their 1½-ton experimental furnace to 3½ tons capacity. The first melt in the enlarged open-hearth furnace was made successfully on the 22d inst.

The pipe mill of the Reading Iron Works, at Reading, Pa., resumed on Monday after a lengthy idleness with 200 men, the employees having had restored to them 5 per cent. of the 10 per cent. reduction in their wages, made some months ago, with a promise that the other 5 per cent. will be restored soon.

### Machinery.

The Webster, Camp & Lane Machine Co., Akron, Ohio, recently shipped one of their hoists, mill, engine and boiler, occupying two cars, to the Sheffield Furnace Company.

The Hussey Re-Heater and Steam Plant Improvement Company, of New York, have under consideration the building of a factory. Hitherto their work has been let by them on contract to outside parties, but the growth in their business has been such as to make it an object for them to manufacture their own goods, and with this in view Mr. Brewer is now seeking a desirable place at which to locate, erect shops and put in a plant. The capital stock of this company is \$100,000, and at the start from 30 to 50 skilled mechanics will be employed. This number will be increased as rapidly as the demand for their machinery will warrant.

Wm. H. Warren, of Worcester, Mass., builder of machine tools, report the following recent sales: To the Union Water Meter Company, Worcester, Mass., one radial drill, weight, 9000 pounds; shaper designed especially to plane brass, and so constructed as to cut 100 feet per minute; also, a new designed two-spindle boring and drilling or milling machine, with spindles at each end of machine, to enter work at each end at same time; to the Atlantic Works, East Boston, Mass., one

radial drill; Brown & Sharpe Mfg. Company, Providence, R. I., fourth radial drill and order for the fifth; Rhode Island Locomotive Works, Providence, R. I., one radial drill; Lane Mfg. Company, Montpelier, Vt., one radial drill; E. Kendall & Sons, Cambridgeport, Mass., one combination slotter, milling and drilling machine.

The National Pipe Bending Company, New Haven, Conn., manufacturers of the National Feed-Water Heater, report their orders for heaters for the last month very satisfactory. Among the heater sales are: One 500 horse-power to New Bedford, Mass.; one 100 horse-power to Willimantic, Conn.; eight heaters to Boston; one 100 horse-power for steam yacht; one 200 horse-power to La Fayette, Ind.; one 100 horse-power and 500 horse-power to New Haven, Conn.; two heaters to Westfield, Mass.; one 80 horse-power to Safford Springs, Conn.; two heaters to Ohio; three heaters to Minnesota, one heater to Dakota, one 500 horse-power to the West Indies; two heaters to Woonsocket, R. I.; one heater to Georgetown, Tex.; one 100 horse-power to Columbia, S. C.; one 200 horse-power to Pensacola, Fla.; one 80 horse-power to Darlington, N. C.; one 500 horse-power to Laredo, Tex.; six heaters to New York City; two 80 horse-power to Yonkers, N. Y.; one 400 horse-power to Edison Electric Company, Brockton, Mass.; and one 200 horse-power to Montreal, Canada. They have orders for one 1000 horse-power, one 600 horse-power, one 500 horse-power, one 300 horse-power, three 200 horse-power, all to be shipped before September 15; also orders for nearly 200 coils of iron pipe.

D. B. Cruickshank, dealer in machinery, Providence, R. I., reports the following sales of machinery: An 80 horse-power Corliss engine to the new Russell Gold Mining Company, Glenbrook, N. C.; a 15 horse-power hoisting engine and boiler to Whitaker & Smith, Fall River, Mass.; a 10 horse-power hoisting engine to Grant & Co., Westerly, R. I.; a 20 horse-power engine and boiler to the Arlington Mining Company, Arlington, R. I., and an 80 horse-power Wheelock engine to B. B. & R. Knight, River Point, R. I.

### Miscellaneous.

The Youngstown Car Mfg. Company, of Youngstown, Ohio, have closed down their works for a short time for the purpose of making repairs and adding improvements that will considerably increase their capacity for production.

The Carondelet Zinc Works, in St. Louis, were sold to Chas. D. McCloose for \$16,000.

### Hardware.

The works of the Newcastle Wire Nail Company, at Newcastle, Pa., are being operated to their utmost capacity in order to keep up with the demands made on the company for their goods. Their works contain 65 nail machines, which are all in constant operation, and this number will shortly be increased by the addition of a number of new machines, which have just been ordered from abroad.

Messrs. Kreamer, Muir and Mitchell, the committee of adjusters appointed by the 38 insurance companies in which the Reading Hardware Company were insured, met the officers of the company and settled the claim. There were 41 policies, aggregating \$205,000, upon 29 subjects of insurance. The loss was confined to 17 of these subjects, on which the insurance amounted to \$170,110, and the total loss on 13 of these subjects aggregating \$155,710, was settled. The work of rebuilding will now be commenced by L. H. Focht, and is to be finished by January 1.—*Reading (Pa.) Times*.

# The Iron Age

New York, Thursday, August 30, 1888.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.  
CHAS. KIRCHHOFF, JR., - EDITOR.  
GEO. W. COPE, - - - ASSOCIATE EDITOR, CHICAGO  
RICHARD R. WILLIAMS, - - HARDWARE EDITOR.  
JOHN S. KING, - - - BUSINESS MANAGER.

## Foreign Iron and a Revival Here.

Lately a somewhat better tone has developed in the iron markets abroad, and those who are operating on the bull side have been making strenuous efforts to secure co-operation on this side of the Atlantic. Proposals to get up pools in Scotch warrants on a 10 per cent. margin have been made, with the object of booming the Glasgow market with the fiction that heavy buying for consumers has again begun. It is argued that with an American demand, added to other encouraging features in the situation, prices cannot help moving upward, while, without aid from us, the course of values is uncertain, with little prospect of a very rapid rally.

The wily Scotchmen who calculate in the manner indicated understand pretty thoroughly what a valuable customer the United States is when enjoying one of its spurts of activity. The following table will illustrate this fact. It gives the English exports for the first seven months to all countries, the exports to the United States during the same period and deducting the latter from the former, the exports to all countries except the United States:

### English Exports of Iron and Steel, Gross Tons.

Pig iron:	1887.	1888.
All countries.....	650,698	608,279
United States.....	249,972	90,222
Countries outside U. S.....	400,726	518,057
Bar, angle, bolt and rod:		
All countries.....	143,686	173,969
United States.....	1,651	3,091
Countries outside U. S.....	142,035	170,878
Railroad iron and steel:		
All countries.....	559,915	597,429
United States.....	92,941	39,723
Countries outside U. S.....	466,974	557,706
Hoops, sheets, &c.:		
All countries.....	189,102	231,756
United States.....	17,350	21,723
Countries outside U. S.....	171,752	210,033
Tin plates:		
All countries.....	207,435	225,016
United States.....	156,738	167,882
Countries outside U. S.....	50,697	57,134
Cast and wrought, n. e. s.:		
All countries.....	208,889	247,770
United States.....	1,721	2,796
Countries outside U. S.....	207,168	244,974
Steel unwrought:		
All countries.....	189,338	90,191
United States.....	150,109	42,219
Countries outside U. S.....	39,169	47,972
Old material:		
All countries.....	176,346	82,503
United States.....	133,125	13,556
Countries outside U. S.....	43,221	68,947

Taking the whole tonnage, it declined only from 2,325,029 tons to 2,257,013 tons in spite of the fact that the total exports to the United States fell off from 803,674 tons to 381,212 tons. In other words, the great falling off in the shipments to this country has been nearly compensated for by better business in other quarters. The falling off has of course been most marked in pig iron, railroad iron, crude steel and old materials, notably in the case of the latter two. It is evident, therefore, that the English market, so far as exports in-

fluence are concerned, is getting into the shape where they can hold their own even without our buying, and that they would show a rising tendency if we were to become buyers again to any considerable extent. Of that, however, there is little prospect. Prices here are below the importing point, so far as the greater part of our territory is concerned, in nearly all lines in which a large importing trade was done last year. Foreign makers cannot touch Bessemer pig except under special circumstances, and the demand for rails is so light that there is no danger of importing pig, or blooms or rails. In mild steel, for slabs and billets, our own works, at low prices, are still taking practically all the business there is. In old material the situation is a little different. While we are still considerably below the importing point the scarcity, with the winter close upon us, and little renewal work going on, is likely to grow more marked as the season advances, and the coming of foreign old rails in some quantity is not beyond the range of possibilities.

Another point is worthy of notice. With a heavy outward grain movement, which the poor crops abroad make likely, freights to American ports are likely to come down. If they should decline enough, it is possible that steel in some quantity may again be sold for this country.

As matters stand, there is room for a moderate advance here without opening the gates for large quantities of foreign goods. From that quarter we are reasonably safe so long as an upward movement here does not obtain too much impetus. The whole situation does not warrant the expectation of a rapid rise, especially not along the Atlantic seaboard, where the revival in some lines in the Western iron trade has found only a mild echo.

## Trusts and Combinations.

There is very great need during the present active discussion of industrial affairs of a far clearer understanding of the meaning and scope of the terms "trust" and "combination." In the speeches of statesmen and economists, in the debates of Congress, in the discussions and comments of the daily press, we meet with the same careless use of the terms. In fact, the point has been reached when every trade association is branded with the name of "trust." This lax use of the term may possibly lead to serious consequences, and it is the duty of those engaged in manufacturing enterprises to vigorously protest.

It is useless to deny that public opinion sees in the modern trust a serious menace to the country. That feeling is now finding expression in tentative efforts to devise some means of providing safeguards by legislative action. Some restrictive measures have been passed, others are contemplated and it is only too easily possible that harsh and sweeping laws may be sanctioned which may prove seriously embarrassing. They are only too likely to strike more heavily those who have not followed the methods complained of. We have repeatedly stated, and we insist again, that the principal characteristic of the modern trust is that those who enter it as manufacturing concerns surrender their identity. As the trusts are organized a manufacturer or a corporation

receive a pro rata quantity of stock, and as managers of their business give over their power absolutely to an autocratic board of trustees. The latter control the purchase of raw material and the sale and the prices of product, decide arbitrarily whether or not particular works shall continue to operate, and fix finally the distribution of profits. The aim is confessedly to remove the very elements in ordinary combinations which have constituted the protection of consumers, and which have caused the public to look leniently upon the associations of manufacturers which have existed in one or another form for centuries and in all countries.

So long as some latitude was allowed to individuals, as in the ordinary combinations, their career, with few exceptions, was short-lived. The greater their abuse of power the quicker, generally speaking, has been their downfall, the longer the period of unbridled competition following it. The result has been that manufacturers have learned to look upon the time of their existence as a period of truce during which to make active preparations for subsequent war. In many instances, too, they have turned out to be nothing more than a special opportunity for those who were least scrupulous in seizing every chance for a breach of good faith. It is an open question with many manufacturers whether in the long run combinations do not do them as much harm as they do good. The majority look upon them as temporary expedients at best to tide over periods of restricted demand.

In a few cases they may do injustice to consumers for a limited time, but, on the whole, they only secure to the manufacturers what every reasonable buyer will concede to them—a fair return on capital invested and for risks taken. The most serious error the managers of combinations can commit is to abuse what power they possess to extort excessive profits, since it surely offers a temptation to outside competition, with all the waste and loss unduly large extensions of producing facilities imply. It is this danger, fully appreciated by manufacturers, which protects the consumer, and has caused him to look upon their formation with some indifference, and certainly without a sense of being menaced.

It is different with that latest phase of industrial development, the modern trust, with its aggregation of enormous capital, wielded by a few men absolutely without responsibility even to their associates in business, crushing competition, extorting special favors from common carriers, and laying under tribute the consumers of a continent. There is a wide difference between such organizations which absolutely stifle competition and the ordinary trade combinations which aim to regulate it. This distinction should be clearly and distinctly recognized. Thoughtful business men have long inclined to the opinion that unbridled competition is far from being a blessing either to the consumer or the producer. If its waste and extravagance can be lessened without prejudice to the consumer the methods adopted deserve the support of the public. With all their faults the ordinary trade combinations tend to that end, and a wholesale condemnation of them as "trusts" would be unjust and full of harm to the best interests of the country.

How little this distinction is understood even in Congress is shown by the "anti-trust bills" lately introduced. Their aim is to punish the alleged offending industries by abolishing or reducing the duties. Among those so treated we find the steel rail manufacturers, whose "trust" was unable to permit a decline from \$40 to \$28.50 in the price in one year. Another "trust" which will more calmly look upon the proposed action is the copper interest, which is to be curbed by abolishing the duty on ore and on ingot. To them the measure will cause little grief, since it is a matter of absolute indifference to the producers of the raw material whether or not there is a duty on metal or not. As the largest contributors to the world's markets, prices have for years been regulated by the latter, and the duty is of as little consequence as the duty on wheat. The only method of meeting the trouble would be to deny the producers the right to sell their product to foreign speculators.

The measures proposed clearly establish the ignorance of industrial affairs on the part of those who have brought them forward. Still, they are a menace to the manufacturing interests of the country, which can be removed only by vigorously insisting that trade combinations are far from being "trusts."

#### The Western Pig Iron Trade.

The month of August has witnessed an exceptional condition of activity in the Western pig iron trade. It is about the usual time for the manufacturers of agricultural implements to place their orders for material to cover their estimated requirements for the ensuing 12 months, and the manufacturers of malleable iron castings have, to a great extent, the same custom. Other consumers of pig iron, however, purchase according to their current wants, or, within certain limits, are governed by the condition of the pig iron trade, except the car-wheel makers, who buy largely in January. This year a peculiar conjunction of events brought about a widespread buying movement which seemed to culminate in August. Almost all classes of customers were represented among the buyers, from those who mainly use charcoal pig iron down to the seekers for the cheapest grade of coke pig iron. The buying movement in the general trade appears to have been started by the rolling mills and pipe foundries, from whom it rapidly extended to other classes of consumers.

The market for mill pig iron was seriously weakened in June, when the Western millowners began to make preparations for a long stoppage of operations, which they believed would follow an expected disagreement with their workmen over the scale of wages. In anticipation of that event they purchased just enough material to last through June, so as to have no stock on hand when they should shut down. This necessitated heavy purchases of pig iron in the latter part of July, when the controversy over wages was abandoned by the manufacturers. At the same time the large cast-iron pipe works began to absorb enormous stocks of the same grade of pig iron. Other consumers of cheap

iron also laid in stocks, as the price seemed to be as low as could reasonably be expected under existing conditions. The movement then took in a wider range of buyers, who were quick to perceive the growing scarcity of cheap iron, and were ready to place orders for a reasonable time in the future whenever they felt certain that the downward tendency in prices had been checked. Some of the Chicago furnace agents found their August trade in foundry pig iron the heaviest they had ever experienced for this season. Even small foundries have placed orders to cover their entire wants for the remainder of the year.

In the very nature of things this activity could not be expected to continue, and, while here and there will be found a furnace agent in receipt of good orders from a few belated buyers, it is highly probable that a period of comparative dullness may again be seen. The furnaces being in good shape now, with their output sold ahead for a considerable extent, prices can easily be sustained at present figures, unless other furnaces are blown in whose product will have to be forced on the market. The slight advance in price noted in our market reports, on a number of brands of Western pig irons, has usually been confined to those selling under what might be considered the normal rate. Other brands have steadily been held at this rate, and their prices have not been advanced. Contracts for such brands, when not sold up, can still be placed at their old price.

The outlook is therefore by no means in favor of a "boom," unless the railroad companies should enter the market and make liberal purchases of all kinds of material. Many of them need to do so, it is true, but they are restrained by the condition of their balance sheets. Heavy traffic this fall, in consequence of the large crops and the expected early export movement toward the seaboard, may very materially change their financial condition, when they would, of course, alter their policy of the utmost economy in all purchases of material. Whether this will be the case or not requires the gift of prophecy.

The present condition of the Western pig-iron trade is fairly satisfactory to the manufacturers possessing good furnace plants, well located and prudently managed. Although prices are considerably lower than they were a year since, the cost of labor, coke, iron ore and transportation has been reduced also, and the manufacturers in but few localities are complaining of their inability to obtain more than mere cost for their product. Those who complain are usually so situated that they are compelled to seek distant markets in which to dispose of their pig iron, and in which they are obliged to meet the competition of local makers. During the latter part of last year and early in the present year the decline in the price of pig iron was so rapid that the Western makers generally, who had time contracts for coke and iron ore, were unable to reduce cost fast enough to keep the balance on the right side. But this has now been remedied, and even if prices do not advance beyond their present figures, the improved position of the trade conduces to decided cheerfulness among the manufacturers.

#### Late Developments in Peru.

The distress in general finances and the deadlock in monetary affairs in Peru have become such since the commencement of the year that something has to be done to enable the country to emerge from its crisis of impoverishment. This is all the more to be desired since considerable foreign interests are involved, among them being those of American railroad contractors. Fortunately for all interested, a favorable change is at length at hand, through the revival, in better shape, of the Grace contract on behalf of the Peruvian bondholders. It is hoped that through a joint arrangement the railroads belonging to Americans, now confiscated, will be released.

Negotiations have been going on at Washington between our State Department and Don Cipriano Zegarra, the Peruvian plenipotentiary, about those railroads, since June last. In April, notwithstanding the firm position assumed in the matter by our Legation at Lima, a decree was issued by the Peruvian Government declaring that the contractor for the Southern railways of Peru, those connecting the Pacific with Lake Titicaca, should immediately turn over the administration and plant to the Government officials, and that an investigation of the responsibilities entered upon by Mr. Henry Meiggs, the original constructor, and Mr. T. L. Thorndike, the present contractor, should be made so as to establish the obligations existing. The same had already been done with regard to the Salaverry and Trujillo Railway, under contract to Mr. E. C. Du Bois, a citizen of the United States. The Oroyo Railway is contracted for by Mr. Michael P. Grace, and although similar action was attempted in the Peruvian Congress, it was not successful. All of these contracts were constituted legally, with the approval and sanction of the established Governments. The contractors are creditors of Peru and claim the right to retain possession of the railways as a guarantee for the payment of the sums due them. Should the Grace contract in its new form be accepted by Peru, this would facilitate matters very much, as the question could be satisfactorily arranged between the bondholders and the contractors.

Lord Donoughmore is on his way to Lima accompanied by Mr. Michael P. Grace, brother of the ex-Mayor. Lord Donoughmore is the representative of the English bondholders of Peru; he has the well-earned reputation in England as a man of solid political attainments in the House of Lords, and of excellent business capabilities in the city of London. The capital which the holders of Peruvian bonds have tied up is about £54,000,000, or, in round numbers, about \$250,000,000. Lord Donoughmore and Mr. Grace will work hard to settle the debt on the basis of the Tyler-Grace-Nauibar contract of May, 1887. That contract was not submitted to the last Peruvian Congress because of certain objections raised by the Chilean Government. These objections, the British syndicate have reason to think, are overcome, and the two gentlemen hope to have the contract sanctioned by the Peruvian Congress now in session. By this contract the English bondholders will surrender their bonds and so cancel the

external indebtedness of Peru. The latter in return gives the bondholders her national railways and certain grants of national agricultural lands and certain mines. The bondholders agree to complete the roads and maintain them in perpetuity.

The mining rights are understood to extend over a series of years. The property includes silver, coal and cinnabar mines, the development of which will require ready capital. The syndicate will be allowed to mortgage their property up to £6,000,000, or \$30,000,000. The railways are expected to yield £80,000 a year. The grant of land for colonization is 1,800,000 hectares, or about 70,000 square miles. The syndicate property is to be free from taxation, and whatever may be imported by the agents of the syndicate to carry out the plans of perfecting the railroad system, &c., &c., is to be free from duty. Peru covers an area of 1,049,270 sq. km. and has a population of 3,000,000, including 350,000 wild Indians and 20,000 white foreigners, and besides 50,000 Chinese. The chief cities are Lima, with 101,488 inhabitants; Callao, 33,502; Arequipa, 29,237; Cuzco, 18,370, and Chiclayo, 11,325. The public indebtedness stood, on July 1, 1886, as follows:

Foreign debt.....	\$257,115,940
Home debt.....	27,800,000
Paper money in circulation.....	88,541,000

Total.....\$373,456,940

The paper money has become nearly worthless, but will of course rapidly appreciate again should the settlement with bondholders be carried to a safe issue this time. On this point no serious doubts seem to be entertained. In both mineral and agricultural resources, Peru is inferior to but few, if any, countries of similar size in South America. If, therefore, public confidence and credit can be restored in the manner proposed and new life and enterprise infused, the country may again flourish long ere this century comes to a close.

### Mad Mathematics.

The New York *Evening Post* of August 11 contains a letter on "The Crippled Iron Industry," of which we give the essential part.

The writer quotes (we do not know how correctly) from a Southern journal this paragraph:

At a meeting of the American Mining Engineers at Birmingham last week Mr. W. M. Bowron, manager of the South Pittsburg Division of the Tennessee Coal, Iron and Railroad Company, showed by a closely itemized statement, allowing 3 per cent. for repairs and 6 per cent. for interest, that iron could be made in the Birmingham district at \$9.04 per ton. He then gives the market prices of pig iron at Cincinnati, as follows:

Ohio and Southern strong coke,	
No. 1.....	\$17.50 @ \$18.00
Ohio and Southern strong coke,	
No. 2.....	16.50 @ 17.00
Ohio and Southern strong coke,	
No. 3.....	16.00 @ 16.50
Southern car-wheel iron.....	30.00 @ 23.00

and continues the argument thus:

Upon inquiry I learned that the freight from Birmingham to Cincinnati is from \$3 to \$3.50 per ton, carload lots. Now, we will figure a little, and see how badly the iron and steel interests are being "crippled."

Taking the lowest grade (No. 3) at the lowest price, and adding the highest rate of freight, we have a margin of \$3.46 per ton, a neat little 38 per cent. The No. 2 grade, figured the same way, shows a profit of \$3.96 per ton, a fraction

less than 44 per cent., and the No. 1 \$4.96, a small fraction less than 55 per cent. All this, mind you, on outside rates of freight and the lowest prices quoted for the various grades. If the "car-wheel iron" can also be produced for \$9.04 per ton it pays, at \$20, a profit of 82½ per cent. It's a pity we can't all have "infant industries," if this is a sample, and it is usually supposed to be the one needing the most protection.

On this remarkable calculation we make no further comment than to state the following facts:

1. Mr. W. M. Bowron, who read the paper at Birmingham referred to, is not connected with the Tennessee Coal and Iron Company.

2. His paper did not discuss, directly or indirectly, the cost of pig iron in the Birmingham district. It referred exclusively to the Sequachee Valley in Tennessee.

3. The cost named by him, in an estimate avowedly not representing any actual existing works, was not \$9.04, but \$9.66 per ton.

4. The ton referred to was the "short" ton of 2000 pounds, whereas the ton in the market quotations is the "long" ton of 2240 pounds, plus an allowance for "sandage," which, on Southern irons, may bring the market ton to 2300 pounds—2268 being, we believe, a minimum.

The *Post* correspondent has, therefore, based his argument on an erroneous quotation, the wrong rate of freight and the wrong ton. It would seem difficult to introduce any further error; but the concluding allusion to car-wheel iron achieves that feat. On this head, we content ourselves with remarking mildly that car-wheel iron does not pay 82½ per cent., and we will leave this ingenious investigator to find out the reason.

### The Use of Private Freight Cars.

Representative Lawlor, of Illinois, has introduced a bill in Congress which is of great importance to iron and steel manufacturers in many parts of the country. It is intended to form an amendment to the Interstate Commerce act, and forbids the use of any other freight cars than those owned by railroad companies themselves. Of course, private cars are used by a vast number of shippers besides iron and steel manufacturers, and all of them are equally interested in this question. It has been found desirable for a variety of reasons for shippers to own their cars whenever they had a large trade in bulky articles at regular points. Among iron and steel manufacturers the custom has grown rapidly within recent years, partly because the largest works have concentrated the purchase of supplies of raw material at certain points, making the use of private cars a possibility, and partly because the railroad companies have frequently been unable to supply their patrons with all the rolling stock needed.

The large steel rail companies of the West, depending largely for their supply of coke on the Connellsville region, have provided themselves with sufficient freight cars to carry their stock to them with the utmost regularity. In times of activity they use such an enormous quantity of coke daily in the manufacture of pig iron that they need almost the entire equipment of a good-sized railroad company kept in constant motion on their account alone. If a freight blockade occurs last-

ing several days or a week the operations of their furnaces are affected, as a sufficient stock of coke is rarely accumulated to tide over such an emergency. If the railroad companies furnished the rolling stock used in hauling coke, freight blockades would be much more frequent than they now are, and facilities would often be so inadequate that manufacturers would be obliged to bank up their blast furnaces, with great inconvenience to other departments of the works and serious loss to the owners.

It has been shown since the Interstate Commerce act has gone into operation how in some lines of business small operators have been practically driven from the field by advantages accruing to large competitors, partly through the use of their own cars. A measure intended for the relief of such shippers should be so framed as to apply to just such cases, and by no means should be made so sweeping as to work injury in other quarters. Establishments of great importance depending upon the regular receipt of supplies of raw materials for their steady operation, and to secure which they have been obliged to provide a large number of their own freight cars, should not be classed with shippers who have acquired the ownership of freight cars for the purpose of securing a commercial advantage over weaker competitors. If Mr. Lawlor's bill should receive favorable consideration and become part of the Interstate Commerce act, much confusion and great inconvenience would be experienced by many iron and steel manufacturers whenever the railroads of the country again become crowded with business.

Some of the largest and finest pieces of casting ever turned out in Reading have just been completed at the Mellert Foundry and Machine Works. They are four Corinthian columns, 26 feet high, 26 inches in diameter at the base and 21 inches at the top, each weighing between 6500 and 7000 pounds. They are intended to support the tower of St. Joseph's Catholic Church, now being erected at Martinsburg, W. Va. The capitals for the columns are of zinc and were made in Salem, Ohio.

The Buffalo Forge Company, Buffalo, N. Y., last week secured a contract for furnishing forges, blowers, exhaust fans and ventilating appliance for the School of Mechanical Engineering, Vanderbilt University, Nashville, Tenn., and are at present working on similar orders from the University of Tennessee, Knoxville, Tenn., and Miller Manual Training School, Crozet, Va., and the State Technological School at Atlanta, Ga.

The Pennsylvania Railroad Company have begun suit in New York against the Arthur Kill Bridge Company for \$5,000,000 damages. The bridge is being built by the Staten Island Transit Company and the Baltimore and Ohio Railroad Company. The Pennsylvania Company claim that the bridge is not constructed upon approved plans, and is a hindrance to navigation, many of their boats having been damaged by being swung against the abutments.

In order to exhibit the resources of Utah most effectively the Chamber of Commerce of Salt Lake have fitted up a rail car in a sumptuous manner, and arranged therein a great variety of specimens representing undeveloped wealth. The car was first sent to St. Louis.

## CORRESPONDENCE.

## Prices on Pipe Fittings.

GALVESTON, TEXAS, August 18, 1888.

To the Editor: In these days, when manufacturers are making and revising price lists of all kinds, it would be well for those interested in the pipe-fitting trade to arrange a uniform price list on fittings. To illustrate the variations in prices, I inclose a table showing the different schedules of prices made on the one line of malleable elbows:

Elbows.	A	B	C	D	E	F	G	H
Inches.	Chicago.	Chicago.	Chicago.	St. Louis.	St. Louis.	St. Louis.	Boston.	New Orleans.
1/8	.04	.04	.04	.04	.04	.04	.05	.05
1/4	.04	.04	.04	.04	.04	.04	.05	.05
3/8	.05	.05	.05	.05	.05	.05	.07	.07
1/2	.06	.06	.06	.06	.06	.06	.09	.09
3/4	.10	.09	.09	.09	.09	.09	.15	.15
1	.16	.16	.16	.16	.16	.16	.22	.22
1 1/4	.23	.21	.20	.21	.20	.23	.32	.32
1 1/2	.34	.32	.32	.32	.32	.32	.38	.38
2	.52	.45	.40	.45	.40	.50	.60	.60
2 1/2	.80	.72	.75	.72	.75	.75	1.25	1.25
3	1.50	1.40	1.30	1.40	1.30	1.40	1.75	1.75
3 1/2	2.00	2.00	1.85	2.00	1.85	2.05	2.10	2.10
4	3.00	2.80	1.80	2.80	1.80	2.80	4.00	4.00

C and E are alike, B and D are alike, G and H are alike.

This is just a sample of the wide variations which run through the whole price list. You will note that there are three different lists used by different houses in Chicago and three in St. Louis. The pound price list is more nearly uniform.

Yours, &c., JNO. W. THOMAS,  
Purchasing Agent, Gulf, Colorado and Santa Fé Railway Company.

## Influence of Aluminium on Cast Iron.

BRANFORD, CONN., August 27, 1888.

To the Editor: The paper with the above title, which was read at the Cleveland meeting of the American Association for the Advancement of Science and printed in the August 23d edition of *The Iron Age*, must have attracted undue attention, and we have much to thank Messrs. Keep, Mabery and Vorce for in their efforts to substantiate and systematize our fragmentary information. The mechanical part of these experiments was conducted with such evident carefulness, and the results were presented graphically in such an intelligent manner that it is to be regretted that, in the place of dealing with an alloy containing 3.86 per cent. of silicon, they did not conduct their trials using metallic aluminium alone. These remarks are of necessity in the form of a criticism, but are submitted with a view to calling attention to a factor in the problem which seems to have been forgotten, and with the hope that further discussion may bring to light additional information. The ferro aluminium used contained 3.86 per cent. of silicon and 11.42 per cent. of aluminium, and in order to introduce the desired percentage of aluminium into the iron experimented with it was inevitable that a certain amount of silicon would also be added, and this too in quantities, though looking small when reduced to per cents, yet large enough to materially influence the results. The effect of silicon upon cast and malleable cast iron has been with me the study of years, and I know that some of the very effects noted by Messrs. Keep, Mabery and Vorce and credited by them to the influence of aluminium might have been caused by the silicon. The carbon in cast iron containing less than 1.25 per cent. silicon and low in manganese is surprisingly sensitive to the least increase or diminution of the silicon, even two-hundredths of 1 per cent. making, under favorable conditions, an appreciable

difference. Using an alloy containing 11.42 per cent. of aluminium and 3.86 per cent. of silicon for introducing into 30 pounds of metal 0.23 per cent. of aluminium, you would also introduce 0.077 per cent. of silicon, and the addition of the latter element would, in all probability, render it very unsafe to draw conclusions touching the precise effect produced by the aluminium alone. The cast iron may have contained not quite enough silicon to coax or force the combined carbon into a graphitic or semi-graphitic form, and the addition, under these conditions, of 0.077 per cent., or even less, of silicon, would be expected to alter very decidedly all of the mechanical and many of the chemical properties of the iron. Not but what the aluminium will do all and more, than is claimed, but before these claims can be scientifically established it will be necessary to disassociate it from the silicon entirely and then calculate its influence alone. The subject in the article referred to is treated under the following heads:

"The Solidity of Castings and the Formation of Blow Holes."

"Does the Aluminium remain in the Iron to exert an Influence when the Iron is Remelted?"

"The Effect of the Aluminium upon the Grain, or the Changing of the Carbon from the Combined to the Graphitic State."

"The Taking Away the Tendency to Chill."

"The Prevention of Sand Scale."

"The Effect upon Hardness."

"The Resistance to a Load Gradually Applied, or a Dead Weight."

"The Resistance to a Load Suddenly Applied, or the Impact."

"The Elasticity."

"Permanent Set."

"The Effect upon the Shrinkage of Iron."

"The Fluidity of the Melted Metal."

In order to make the point of my criticism more clear, I will follow the order here laid down and remark, first, under the head of "the solidity of castings and the prevention of blow-holes," that it has not yet been my good fortune to see any "Mitis iron"—wrought-iron castings containing a small percentage of aluminium—that was solid and free from blow-holes; but, on the contrary, all the specimens that have come to my notice, and all that I have now before me, are full of blow-holes of the most pronounced type; and the defect has been serious enough—even when the metal was melted in crucibles, and run into baked fire-clay molds, to cause the complete financial failure of at least one concern in this country. But, in the case in hand, it would be natural to expect that the addition of the aluminium silicon alloy would decrease the tendency of blow-holes and porosity, for the action of the silicon alone would be in this direction, as every one knows who has studied the Terre-Noire process or any of the solid steel casting processes in this country.

In the "Mitis iron" an alloy of aluminium, iron and silicon was also used, and the partial prevention of the blow-holes may have been due more to the silicon than anything else.

"The effect of aluminium upon the grain, or the changing of the carbon from the combined to the graphitic state, and 'the taking away the tendency to chill.'" In this connection it would seem to me impossible to ascertain the effect of aluminium when introduced in combination with silicon, for when the carbon is near the balance—that is, near the point where it will readily assume either the graphitic or the combined form—it will manifestly require but a slight change in the proportion of silicon to throw it one way or the other; the silicon being increased, the carbon would tend to separate in the graphitic form, changing the grain and of course decreasing the tendency to chill. The composition of the iron experimented with in this case was as follows: Si = 0.186%; P = 0.263%; S = 0.3%; Mn = 0.092%.

It is stated that the addition of three-fourths of 1 per cent. of aluminium caused the carbon to separate in the graphitic form. Now, in adding enough of the alloy before mentioned to introduce this 1 per cent. of aluminium, it was necessary to introduce 0.254 per cent. of the silicon, and this, added to the 0.186 per cent. silicon that the iron originally contained, makes the total silicon 0.44 per cent.—quite enough under favorable conditions to permit the carbon to assume the graphitic or semi-graphitic form, and quite enough also to account for any decrease in the chilling property. As far as it was tried—up to 4 per cent.—it was found that the iron became softer and grayer as the aluminium was added, and this would naturally follow from the silicon introduced, which, in this case, would have been about 1.35 per cent., making the total silicon in the iron about 1 1/2 per cent. So likewise with the tests for "resistance against dead weight," "impact," "permanent set," "shrinkage" and the "fluidity" of the melted metal, the silicon introduced every time would produce the same effects under right conditions as those noted, so that even if the aluminium acted in a like manner, no such conclusion could be drawn from tests when an alloy containing silicon is used. Possibly the facts are as Messrs. Keep, Mabery and Vorce have stated, and it may be that they have made other trials which have anticipated the direction of my criticism. If such is the case they would place their co-laborers under even heavier obligation to them by publishing such facts, thus making a valuable addition to the world's metallurgical knowledge.

ALFRED E. HAMMER.

## The Mission of Mechanical Engineering Schools.

NEW YORK, August 15, 1888.

To the Editor: It is only this day I note Mr. Hawkins's letter in your issue of the 2d inst. Whether I have set up, as Mr. Hawkins maintains, a "man of straw," or whether I have conclusively shown the fallacy of Mr. Hawkins's real argument, as I believe I have done, can be best judged by the unbiased reader, interested, by a perusal of our two addresses in full, not by reading extracts from either. Mr. Hawkins's paper is published complete in the Transactions of the American Society of Mechanical Engineers, 1888 (and probably elsewhere), mine in the *Stevens Indicator* of July 15, 1888, and in *Science*, June 22, 1888.

I think I have clearly shown the reasons why the printing press can legitimately come in for but comparatively little attention in the technical school, and certainly not at the expense of any time or study now devoted to the prime movers, notably the steam engine. This position I have taken not in the "spirit to defend at every point" my *Alma Mater*, nor indeed on account of any special loyalty to technical schools in general, but simply as being my unbiased conviction, derived from careful consideration and study of the subject.

Indeed, I fear Mr. Hawkins is too apt, the moment his views on technical schools are attacked, to conclude and proclaim that it is due to inborn prejudice on the part of the professors of engineering or of the engineers who have enjoyed a technical school training, instead of carefully considering whether his views, and not the party attacking them, may be at fault.

At the same time I realize that Mr. Hawkins has really the friendliest intentions toward the technical schools, and that on these questions of technical training honest differences of opinion may exist among men who have given the matter some attention. As a fact, this was clearly intimated in my address, which was conceived and written in a spirit of fairness. I should have left

Mr. Hawkins's letter unanswered, were it not for his imputation to the contrary, to which I decidedly object.

As it is, the purpose of these lines is merely to ask the unbiased readers interested to read both papers in full before reaching any conclusion, confident that when this is done they will not consider that I have demolished a "man of straw," as Mr. Hawkins is so ready to assert, but rather that I have demolished the erroneous argument advanced by Mr. Hawkins in his paper read before the American Society of Mechanical Engineers, May, 1888. ALFRED R. WOLFF.

A New Method of Making Copper Pipes.

The disastrous explosions of brazed copper steam pipes which occurred on the Elbe and Lahn have directed the attention of engineers to the subject of the strength and reliability of brazed pipes. Mr. W. Parker, chief engineer surveyor to Lloyd's Register, presented, at a recent meeting of the Institution of Naval Architects, a paper, in which not only is given a scientific explanation of the cause of these failures, but a remedy is also pointed out. Mr. Parker, after referring to tests made with a portion of the steam pipe of the Elbe, and citing the experiments made by the Franklin Institute relative to the decrease of strength in copper at high temperatures, comes to the conclusion that even at the temperature of 360° F., corresponding to steam at 150 pounds, the pipe should still have had a factor of safety at 8½; and that the true explanation of the explosion must be sought in a local injury of the material during the brazing operation. He found that the copper becomes perfectly brittle at a temperature only slightly exceeding brazing heat. In this condition the pipe might be accidentally cracked, and although the section of the metal still remaining intact might be sufficient to withstand the cold water test, yet subsequent use with hot steam might develop the crack, and the pipe ultimately gives way at the working pressure. About the various remedies which have been suggested or tried to increase the strength of such pipes, the author gave no opinion; but he brought under the notice of the institution a new process of manufacturing copper pipes, by W. Elmore, which require no strengthening.

We quote from the paper as follows in regard to the details of this process: A mandrel is surrounded by ordinary unrefined Chili bars arranged upon strong supporting frames in a depositing tank of sulphate of copper, and the copper is dissolved or decomposed, as will hereafter be explained, and is deposited in the form of pure copper on the revolving mandrel, leaving the copper in the form of a shell or pipe of any thickness required, fitting closely to the mandrel. When the required thickness has been deposited the pipe and mandrel are exposed to the action of hot air or steam, then the copper expanding more than the iron admits of the mandrel being drawn, leaving the copper in the form of a pipe, without a seam, perfectly round and true both internally and externally, or the pipe may be expanded or made larger by rolling or other mechanical means, and then the mandrel withdrawn. The deposition of copper by electricity is not at all new. It has been in use for years for electrotyping purposes, and for separating copper from its impurities, and particularly for extracting gold and silver. But copper thus refined is wanting in cohesive properties, and without some means of increasing its density, which would give to it at the same time both tenacity and ductility, it would in

such a form be useless for mechanical purposes. The ingenious manner in which this difficulty is overcome by the present process constitutes its most important feature.

A burnisher or planisher, composed of a small square piece of agate, being the hardest and smoothest substance suitable and available, is supported upon proper arms and levers, and the agate is allowed to press lightly upon the surface of the copper on the revolving mandrel. The burnisher is caused to traverse from end to end of the mandrel by means of a leading screw at any required speed. After it has traversed the whole length of the mandrel it is automatically reversed, and commences its journey backward. The speed of the revolving mandrel and the speed of the traversing burnisher is so adjusted or arranged that the whole surface of the copper is acted upon by the burnisher, the result being that every thin film of copper deposited upon the mandrel must be separately acted upon, burnished and compressed into a dense and cohesive sheet of pure copper possessing a great amount of tenacity and ductility, as will be seen from the experiments and tests which I have made. The impurities or dross fall to the bottom of the tank in the form of mud, and when washed, dried and smelted in a crucible the gold, silver, &c., contained therein can be easily separated. In fact, during the operation of refining copper from the rough Chili bars the finished article is automatically produced in the form of a pipe, and all the impurities are extracted and can be collected.

While I was present at the works of Mr. Elmore, the patentee of this process, four pipes were made. The mandrels had been revolving in the baths for about 170 hours, and the copper in this length of time had reached a thickness of 0.198 inch. The pipes were taken off the mandrels in my presence, and the ends of the pipes cut off so as to present a portion of the pipes acted upon by the burnisher. The remaining portion, or rough ends, showed the nodules, or rough copper, not acted upon by the burnisher, and was in a completely brittle condition. It is well known that the structure of ordinary electro-deposited copper is purely crystalline, and easily disrupted under stress. The adjoining faces of the crystals, of which the whole mass is composed, appear under the microscope to be separated from each other, and have very slight cohesive power.

In order to show the effect of the burnisher upon the material, I have had the structure of specimens of pieces of copper magnified under a microscope and then photographed. One photo was taken from an ordinary piece of cast copper. A second was taken from a rolled bar of copper. The difference in these two structures is very perceptible, and plainly shows the effect of work in the shape of rolling. A third shows the structure of a piece of ordinary deposited copper not burnished, and a fourth shows the structure of a piece of copper one-third unburnished and two-thirds burnished. From these photos it can plainly be seen to what extent the crystals are reduced in size, and the cohesive power of the material increased.

To describe more in detail how the decomposition of the unrefined copper is effected, and how the deposit takes place, I may state that the unrefined Chili bars are cast into slabs of the required length of the pipe, and these are arranged longitudinally in a wooden tank in such a manner that the faces of the slabs are approximately at equal distances from, and parallel with, the surface of the cylindrical mandrel, both at its sides and underneath it, leaving the upper side open for the burnisher to travel over. The man-

drel is fitted with a properly insulated spindle, running in insulated bearings, and driven by suitable wheel gearing, &c. The whole of this arrangement is immersed, as before stated, in a bath of sulphate of copper. The mandrel forms what is termed the cathode, and the copper bars the anode, of the electric circuit. The cathode is connected with the negative pole of an ordinary dynamo machine, and the anode with the positive pole. When the dynamo is set in motion, an electric current passes through the solution, and the following chemical changes take place. The sulphate of copper is decomposed, and the sulphuric acid is transmitted to the anode, there to attack and dissolve or combine with a quantity of copper equal to that which has been liberated or deposited upon the cathode.

Mr. Parker gave tables of tests referring to pipes made under Mr. Elmore's process, solid drawn, and brazed from sheet copper, from which it appears that in point of tensile strength and ductility the electro-deposited pipes have a great advantage over the other pipes. In Mr. Elmore's pipes the tensile strength varied from 23.22 to 24 tons, and the contraction of the area of fracture from 71 to 82 per cent. In the solid drawn pipes the corresponding figures were 20 to 20.5 tons and 12.8 to 43.6 per cent., while the brazed tubes only showed 14 tons tensile strength, with from 31 to 45.5 per cent. contraction.

Cost of Pipe Fittings.

In an article on molding pipe fittings in this country, contributed by W. D. Forbes to *Engineering*, the following tables are given of the price paid to the men for making cores and molding:

Price for Cores.

Size.	Elbows. Cents per cwt.	Tees. Cents per cwt.
1/4.....	\$0.10 @ \$0.13	\$0.10 @ \$0.13
1/2.....	.10 @ .13	.10 @ .13
3/4.....	.10 @ .15	.10 @ .13
1.....	.09 @ .12	.09 @ .12
1 1/4.....	.09 @ .12	.09 @ .12
1 1/2.....	.10 @ .14	.12 @ .16
1 3/4.....	.10 @ .14	.12 @ .16
2.....	.14 @ .16	.14 @ .18
2 1/2.....	.15 @ .18	.16 @ .18
3.....	.25 @ .50	.25 @ .50
3 1/2.....	.50 @ 1.25	1.00 @ 1.50
4.....	2.00 @ 2.25	2.00 @ 2.50
4 1/2.....	2.00 @ 2.25	2.00 @ 2.50
5.....	2.00 @ 3.00	2.00 @ 3.50
6.....	4.00 @ 6.00	4.00 @ 8.00
7.....	4.00 @ 6.00	4.00 @ 8.00
8.....	6.00 @ 10.00	10.00 @ 16.00

The corresponding per flask for elbows and tees each is given as follows, varying with the different sizes:

Size.	Price per flask each, elbows and tees.	Size.	Price per flask each, elbows and tees.
1/4.....	2 @ 2 1/4	2 1/4.....	3 1/2 @ 6
1/2.....	2 @ 2 1/4	2 1/2.....	3 @ 4 1/4
3/4.....	2 @ 2 1/4	3 1/2.....	3 @ 4 1/2
1.....	2 @ 2 1/4	4.....	4 1/2 @ 5
1 1/4.....	2 @ 2 1/4	4 1/2.....	5 @ 10
1 1/2.....	2 @ 3 1/4	5.....	10 @ 15
1 3/4.....	2 @ 3 1/4	6.....	12 @ 20
2.....	3 1/2 @ 5 1/4	7.....	15 @ 20
2 1/2.....	3 1/2 @ 5 1/4	8.....	15 @ 25

The men are required to shovel their own sand and dump their molds.

James Acton Miller and C. G. Barnd, of Fostoria, Ohio, have invented a process and have perfected the appliances in connection with it, for the purpose of utilizing natural gas in the manufacture of iron and steel.

The Perkins Lock Company have been incorporated at Cleveland, Ohio, with a capital stock of \$100,000. Geo. H. Robbins and others are the incorporators.

### Samuel Noble.

On Monday, August 13th, one of the foremost ironmasters of the South, and of this country, Mr. Samuel Noble, died, after a brief illness, at Anniston, Ala., of nervous prostration, caused by a severe attack of cholera morbus. The *Anniston Hot Blast* has presented the following sketch of his life:

Samuel Noble was born in Cornwall, England, November 22, 1834, of James and Jenifer Ward Noble. He was the fifth of 12 children, seven boys and five girls, of whom ten are now living, the oldest, a boy, having died in childhood. In 1837 his father removed with his family to America, settling at Pottsville, Pa., from which place he afterward moved to Reading.

In 1855 the family moved to Rome, Ga., where the father established an iron foundry, machinery for which two of the sons, Samuel and William, brought by schooner from Philadelphia to Savannah. Their business in Rome grew and prospered, and their plant was from time to time enlarged. During the war they made cannon for the Confederate Government.

Mr. Samuel Noble spent considerable time exploring the iron regions of Georgia and North Alabama, and acquired a thorough familiarity with their character. During his tours of investigation he frequently visited the locality that is now the site of Anniston, and looked upon it as the most desirable of all the places he had seen for the manufacture of iron. He wanted to build a furnace here, but had not the money. Early in 1872 he accidentally met in Charleston, S. C., Gen. Daniel Tyler, who had been an officer in the Federal army during the war.

Mr. Noble and General Tyler discussed the manufacture of iron in Alabama, and the result was the organization, some months later, of the Woodstock Iron Company and the building of the first Woodstock furnace, which commenced operations in 1873. From that time dates the most active and productive period of Mr. Noble's life. Within the succeeding 15 years he compressed the lifetime work of a dozen men, and accomplished results of stupendous magnitude. The history of his life during that time has often been told in the recital of the history of Anniston. The two cannot be separated. Anniston is the outgrowth of that little settlement planted here in 1873 by the Woodstock Iron Company.

It was an ambition of Mr. Noble that Anniston should be a center of education and refinement, and of moral and religious influences, and all religious and educational enterprises received from him the most liberal support and encouragement. Among other deeds of philanthropy, for which he will be remembered in the years to come, was the building of the Boys' Academy and Noble Institute for Girls, erected at an aggregate cost of \$27,000. The Institute for Girls has been in operation two years, and the Boys' Academy opened its doors last fall. Mr. Noble recently endowed these schools with \$5000 each, the income from which (guaranteed by him to be not less than \$400) is to pay for ten scholarships to be awarded to pupils in the public schools, entitling the holders to two years' tuition.

Mr. Noble was essentially and pre-eminently a self-made man. His early educational opportunities were limited, and he started in life with but a meager common-school education; yet his mind in later years was a storehouse of information on all ordinary subjects of human knowledge.

Mr. Noble was an earnest, persistent and uncompromising advocate of the system of Governmental protection of home industries and home labor by the imposi-

tion of tariff duties on imports of foreign-made goods. He believed that the prosperity of a country depends upon the profitable employment of labor and capital, and he believed that without the aid of protection the American workmen would be reduced to the unhappy condition of the impoverished labor of England.

Mr. Noble came of a long-lived family. His father died last January in his 83d year, and his mother is now living at the age of 83. Until the death of his father there had not been a death in the family for 50 years.

In 1861 Mr. Noble married in Philadelphia Miss Christina Stoekel, who survives him. He leaves four children, Mrs. E. E. G. Roberts, Mr. S. E. Noble and Miss Addie and Josephine Noble. His brothers and sisters are Messrs. John, William, George and James Noble, of Anniston; Mr. Stephen Noble, superintendent of the furnace at Ironton; Mrs. J. Donkle, Mrs. S. T. McMillan, Mrs. H. A. Smith, Miss Elizabeth Noble and Miss Mary Noble, all living at Rome.

The funeral services were held on Wednesday, August 15.

### Weights on Locomotive Drivers.

In the course of a recent article on the excessive weights which are now being placed on locomotive driving-wheels, the *National Car and Locomotive Builder* says:

Ten years ago the engineers of many railroads used their influence to prevent more than 10,000 pounds being placed on one wheel, and even with that comparatively light weight the indications were that the locomotive caused the greater portion of the wear to the rails. Mr. O. Chanute investigated this subject very carefully some years ago, and he found that with the light weights then in vogue the pressure of the drivers on the limited point where the tire and rail meet approximated closely to the ultimate crushing resistance of the metal. He concluded that from one-half to three-fourths of the rail wear was due to the pressure of the engine-wheels alone. European engineers experimenting in the same direction reached conclusions substantially the same in regard to the wear of rails on the lines they were connected with. When the wear, under the impact of locomotive drivers, was so great with half the weight now often placed on each wheel, the existing state of affairs is likely soon to demand a remedy. Complaints about the rapid wear of steel rails are already highly pronounced on many roads, and the present tendency is to put the blame upon the manufacturer. The prevalence of cold flow of metal on the surface of the rails, and of numerous crushed rail ends on the divisions where locomotives with excessive weight on the drivers are at work, may soon direct attention in another direction.

The tendency constantly is to place increasing burdens upon the locomotive. The cars are every year built heavier and the locomotive must pull the same number or more and make faster time with the trains. Then the boiler has to supply steam for compressing air to operate brakes and signals, and those in charge of the mechanical departments perceive that their engines must soon be able to provide steam for heating the cars and for driving dynamos to generate electricity for lighting purposes. This being the case, there is strong temptation to design locomotives with boilers so large that the weight on two pairs of drivers is too great for the rails. The question then arises, Why not use three pairs of driving wheels and by that means make a better distribution of the weight? A few roads have tried mogul or ten-wheel engines for passenger service, and we see no reason why the practice should not be widely ex-

tended. Before the strike of their locomotive engineers the mechanical department of the Chicago, Burlington and Quincy were for some time engaged on a series of interesting and valuable tests, undertaken to establish the relative efficiency of different types of locomotives in hauling exceptionally heavy passenger trains over an undulating road at a fairly high rate of speed. The best work in handling the train was done by a new mogul passenger engine built at the company's shops and a 10-wheel engine belonging to the Chicago, Burlington and Northern. The latter engine was taken directly out of freight service without any change, and she handled the heavy passenger train admirably, showing that on the level she could keep a train of 12 heavy coaches running at a speed of over 50 miles an hour. This proved that the engine could make speed sufficient enough for all practical purposes; but the leading point of superiority about the engine was the expeditious way in which she could pull the heavy train into speed from the numerous stopping places. The Michigan Central people have been running a ten-wheel Schnectady engine with so much success that on their fastest heavy through passenger trains that they intend getting more locomotives of the same class for the service that has hitherto been so difficult to operate promptly with eight wheelers. Stop or slow up points will always be numerous on our railroads, and the locomotive that can raise the train most quickly into speed will have a decided advantage over those that are designed merely for maintaining a high speed.

Other companies which have tried mogul and ten-wheel engines for heavy passenger service have met with very encouraging results; yet there is a widespread antipathy to placing a locomotive with more than two pairs of drivers in front of a passenger train. There is want of confidence in the safety of this class of engines for high speed that does not appear to rest on the foundation of experience. Men will say that it is not safe to have the heavy rods required for six coupled engines flying up and down at the velocity required for a fast running train; but no one will give particulars of the breakage of rods belonging to that class of engine caused by fast running, for accidents of the kind are scarcely known. The rods and running gear of a six-coupled locomotive may be a little harder to maintain on fast passenger service than the same parts of an eight-wheel engine, but the difference is not sufficient to count against the former type of engines being employed on the work named. We are satisfied, where it is necessary to use 50-ton locomotives for passenger service, that it will be found more economical to place the adhesive weight on three pairs of driving wheels than on two pairs. If the engine is specially designed for fast running, with large wheels, long steam ports, ample bearings and well-proportioned rods, the cost of maintenance will be no more than in the case of overweighted eight-wheel locomotives.

The Freeman Wire Company are about to begin the remodeling of their wire plant. Among other improvements contemplated at the works is the substitution of a 400 horse-power engine, likely of the Harris-Corliss type, for the engines now working, the same to drive both the wire mill and the barb wire factory. They will reopen their main office in this city within a few days.—*Age of Steel, St. Louis.*

David Round & Son, of Cleveland, Ohio, who operate a chain works at Findlay, Ohio, inform us that they have closed down the works for an indefinite period on account of a lack of orders.



SAMUEL NOBLE.



# TRADE REPORT.

## Philadelphia.

Office of *The Iron Age*, 220 South Fourth St.,  
PHILADELPHIA, Pa., August 28, 1888.

**Pig Iron.**—A firmer feeling has been developed in Pig Iron, and orders for large lots are hard to place. This, however, is due more to the diversion of certain brands to other points than to any improvement in the local demand, although the effect upon prices is the same. Writing from this point, and leaving other correspondents to report their respective markets, it is a matter of regret that we cannot find any material increase in the volume of business in this vicinity. Prices are all firmer, in sympathy with the movements elsewhere, and they will doubtless continue to sympathize with any further movement; but, apart from that, there is nothing in the market to indicate any independent action of its own. There is a scarcity, of course, because a great deal of Iron is being drawn to the West, which, until recently, has been coming this way, while agents of Southern furnaces report that elsewhere they can do nearly \$1 per ton better than in Philadelphia. This leaves consumers dependent upon local furnaces, but for the present they seem able to meet the demand at current rates, and, as a matter of fact, quote precisely the same figures as a week ago, although they discriminate closely in regard to quantity, giving the preference to regular customers. It is now pretty well settled that there is no chance whatever for lower prices this season, and it is by no means certain that an advance of 50¢ @ \$1 per ton may not be realized. All depends upon the continuance of the demand West; if they can maintain their present position, prices here will doubtless work toward a somewhat higher level. Meanwhile, covering both ends of the market, quotations for tidewater deliveries are about as follows: No. 1 Foundry, \$18 @ \$19; No. 2, \$17 @ \$17.50; Gray Forge, \$15.75 @ \$16.50.

**Foreign Iron.**—There is a disposition to place orders, but the firm tone manifested abroad prevents anything being done at present. Sellers quote \$19.50 @ \$20 for Bessemer, c.i.f., duty paid, but bids are a full dollar below those figures.

**Blooms.**—A liberal movement is reported in Steel Blooms at figures within the limits quoted below, price according to analysis, &c. Nail Slabs, \$28.50 @ \$29.50; Billets from \$30 to \$35, f.o.b. cars at mill, according to analysis; Charcoal Blooms, \$52 @ \$54; Run-out Anthracite \$42 @ \$44; Scrap Blooms, \$33 @ \$35 per "bloom" ton of 2464 lb. Foreign at tide, c.i.f., duty paid, \$29 @ \$30 for Nail Slabs; \$31.50 @ \$32.50 for 4 x 4 Billets, and \$35 @ \$39 for Siemens-Martin, price according to analysis, &c.

**Muck Bars.**—There is a good deal of activity in this department, and a large business could be done at about \$27.50, delivered. Holders are firm at \$28 (in some cases \$28.50) delivered, but buyers do not respond freely to the advanced ideas of holders, unless from necessity.

**Bar Iron.**—A slight improvement can be reported in this department. Several of the mills have taken some good-sized Skelp orders, which with other specialties takes them pretty well out of the market for the present. A somewhat heavier demand for Bars is also noticeable, so that manufacturers are inclined to be a little firmer in their prices. There is also less competition from the West, notwithstanding that Ohio Bars have been offered during the week at extremely low figures.

But, taking the market as a whole, there is doubtless a much better feeling, more business, and as a rule a little better prices, but nothing beyond that. The outlook is considered fairly satisfactory, and prices for the Best Refined Bars are steady at 1.85¢ @ 1.9¢, and Grooved Skelp at 1.8¢ @ 1.82½¢. At the same time, Bars said to be of good quality can be had in round lots at from 1.7¢ to 1.8¢, and a good deal of business has been done at these figures, and comparatively little at the higher quotation, but all depends on what the buyer is willing to accept as a guaranteed quality.

**Plate and Tank Iron.**—The demand for small lots is well maintained, but mills have not accumulated orders to any important extent, so that prices are still about as they were some time ago. The feeling is improving, however, and there is a general impression that a larger volume of business will be forthcoming during the next three or four weeks, although at the moment nothing of importance is on the market. Prices remain about as before, viz.: Ordinary Plate and Tank Iron, 2¢ @ 2.10¢; Shell, 2.4¢ @ 2.5¢; Flange, 3.5¢; Fire-Box, 4¢; Steel Plates, Tank and Ship Plate, 2.3¢ @ 2.4¢; Shell, 2.7¢; Flange, 3¢ @ 3½¢; Fire-Box, 3½¢ @ 4½¢.

**Structural Iron.**—No great amount of business has been done during the week, but small orders have come in quite freely, so that the mills about hold their own. Notwithstanding the reported activity in Western markets, the outlook in this vicinity fails to develop anything different to what we have reported for some time past. Still, the feeling is hopeful, and if there is no improvement there certainly is no retrogression. Prices about as follows: 2¢ @ 2.10¢ for Bridge Plate; 2¢ @ 2.10¢ for Angles; 2.6¢ @ 2.7¢ for Tees, and 3.3¢ for Beams and Channels, Iron or Steel.

**Sheet Iron.**—Although there is an absence of large orders there is enough demand in a small way to absorb pretty much the entire output, and stocks in manufacturers' hands are no larger than in ordinary seasons. Prices for good makes are firmly maintained, but in other cases a good deal of irregularity is reported. Small lots are quoted as follows:

Best Refined, Nos. 26, 27 and 28... 3¼ @ 3½¢  
Best Refined, Nos. 18 to 25... 3 @ 3¼¢  
Common, ¼¢ less than the above.  
Best Bloom Sheets, Nos. 26 to 28... 4½ @ 4¾¢  
Best Bloom Sheets, Nos. 22 to 25... 4 @ 4¼¢  
Best Bloom Sheets, Nos. 16 to 21... 3½ @ 3¾¢  
Blue Annealed... 2.8 @ 3 ¢  
Best Bloom, Galvanized, discount... 62½¢  
Common, discount... 67½¢

**Merchant Steel.**—The general tone of the market continues strong, and, while prices are not quoted higher, there is a firmness that indicates a confident feeling, and a few weeks more of activity, such as the last two have been, will probably go far toward securing some advance in prices. Manufacturers are regaining confidence and, as a rule, anticipate a large fall trade. Prices are quoted as follows for lots from store: Tool Steel, 8½¢; Machinery, 2½¢; Crucible Spring, 4½¢; Open-Hearth Ordinary Spring, 2½¢ @ 2½¢; Crucible Machinery, 5¢; Best Sheet Steel, 10¢; Ordinary Sheet, 8¢.

**Steel Rails.**—There is very little change to notice in this department. The demand is chiefly for small lots, and these for prompt delivery. Sales have been made for lots of 1000 @ 2000 tons each at \$28.50 @ \$29 at mills, and in the absence of a demand for large lots, these are probably firm quotations.

**Old Rails.**—An active inquiry is reported for Old Rails, but there are none for sale in this market at prices likely to attract attention. Bids of \$21 @ \$21.25

could be had for spot lots or lots to arrive, but there are none on the market at present. Sales in the interior are reported at from \$22.50 to \$24, delivered to mills, price according to location.

**Scrap Iron.**—A very active demand is reported, and prices are firm, with an advancing tendency. Quotations about as follows: \$18.50 @ \$19.50 for cargo lots; \$20 @ \$21 for carload lots, delivered, or for choice \$21.50 @ \$22; No. 2 do., \$14 @ \$15; Turnings, \$13 @ \$14; Old Steel Rails, \$19 @ \$20; Cast Scrap, \$14 @ \$15; do. Borings, \$9 @ \$10; Old Fish Plates, \$24 @ \$25. Old Car-Wheels, \$17 @ \$18, Philadelphia, or its equivalent.

**Wrought-Iron Pipe.**—There is a continued good demand for Pipe of all sizes. Prices remain firm but unchanged, although there is some talk of a slight advance. Discounts are quoted as follows: Black Butt-Welded, 55 ¢; on Galvanized do., 45 ¢; on Black Lap-Welded, 65 ¢; on Galvanized do., 52½ ¢; on Boiler Tubes, 60 ¢.

**Nails.**—There is no change to note in the general situation. Prices show no improvement whatever. Standard brands are held at \$1.90 for carload lots, while those of uncertain quality are difficult to market within 10¢ of that figure. There seems to be a lack of confidence, and to do business manufacturers are compelled to quote figures that leave little or no profit in the transaction. Lots from store are quoted at \$2 per keg.

## Chicago.

Office of *The Iron Age*, 95 and 97 Washington St.,  
CHICAGO, August 27, 1888.

The feature of the past week has been the advance in Old Iron Rails. They had shown an upward tendency for four weeks, but last week they suddenly jumped from \$21 to \$24, with more sales reported than usual. Other material is firmer in sympathy.

**Pig Iron.**—Some of the largest sellers of Lake Superior Charcoal are now out of the market, having taken all the orders they cared to book for future delivery at current prices. The others are endeavoring to get an advance from belated buyers, very few of them being willing to take orders at our inside quotations. The demand for Strong Coke Foundry is improving, and outside figures are being more easily obtained as buyers increase and sellers decrease. Mill grades are now relatively dearer than Foundry, both in Northern and Southern Iron, doubtless in sympathy with the advance in Old Rails, which will cause some consumers to use Mill Pig more largely. Prices of Southern Irons are almost up to prohibiting figures. Mill grades having already passed that point. The demand for Iron is now on a very fair basis, consignments being easily placed among the local foundries. We quote for cash as follows: Lake Superior Charcoal, all numbers, \$19.50 @ \$20; Alabama Car-Wheel, \$26.25; Southern Charcoal Foundry, No. 2, \$18 @ \$19; Jackson County Softeners, No. 1, \$18 @ \$18.50; Hocking Valley, Soft Foundry, No. 1, \$17 @ \$18; American Scotch (Blackband) No. 1, \$18.50 @ \$19.50; other Ohio Scotch Irons, No. 1, \$17.50 @ \$18; Lake Superior Coke, No. 1, \$17 @ \$18; No. 2, \$16 @ \$17; No. 3, \$15 @ \$16; Southern Coke, No. 2, \$17.25 @ \$17.50; No. 2½ and Open Bright, \$16.50; No. 3, \$15 @ \$16.25.

**Bar Iron.**—The heavy orders of the season have been generally placed by this time, and apart from the regular buyers the car trade is now looked to for an occasional lift. It is expected that car orders will improve very shortly, as the freight business of the railroads is increasing. The receipt of heavy orders and the

advance in raw material are making the manufacturers very stiff in their views, while many of them have really advanced their rates. New business cannot easily be placed below 1.70¢ f.o.b., Chicago half extras, for carload lots of common Iron. Jobbers quote 1.80¢ @ 2¢ from store, according to quantity and quality.

**Structural Iron.**—Although bridge-work has been less active in the past week, the demand for Beams for buildings has been excellent. This business has largely originated outside of Chicago, the local building trades being somewhat quiet. Angles are quoted from store at 2.40¢ @ 2.50¢; Tees, 2.60¢ @ 2.70¢; Beams and Channels, 3.80¢. From mill the following quotations are made on carloads: Angles, 2.20¢; Universal Plates, 2.30¢; Tees, 2.45¢; Beams, 3.40¢.

**Plates, Tubes, &c.**—The Plate mills are very full of orders, some of them declining to quote on new business. Local dealers report no large orders in the market recently, but a very healthy store trade. Prices are very firm. Tubes continue to be sold at the old price in small lots, but the recent advance by the mills has been maintained. Store prices are as follows: Heavy Sheets, Nos. 10 to 14, 2.65¢; Tank Iron, 2.55¢; Tank Steel, 2.80¢; Shell Iron, 3¢; Shell Steel, 3.25¢; Flange Iron and Steel, 4¢; Fire-Box Steel, 4.75¢ @ 5.75¢; Boiler Rivets, 4¢ @ 4.25¢; Ulster Iron, 3.75¢; Boiler Tubes, 60 % and 10 % off on 2½-inch and larger and 62½ % off on 2-inch and smaller.

**Sheet Iron.**—The excitement among the heavy buyers has not subsided, as all of them appear to have found manufacturers able to supply them. Sales of carload lots from mill are therefore much less numerous. For immediate or reasonably early delivery prices are still held at 3¢ @ 3.05¢, f.o.b. Chicago, for No. 27, but those who are willing to wait until late in November and December can shade these prices slightly. Small lots are sold from store by jobbers at 3¢ for No. 24, 3.10¢ for Nos. 25 and 26, and 3.20¢ for No. 27, with a concession to best buyers.

**Galvanized Iron.**—A good condition of trade is reported by manufacturers' agents, whose warehouses are kept stocked with assorted gauges and sizes with some difficulty. Prices are fairly maintained, but small lots of Juniata are now to be had at 60 % and 10 % off, and Charcoal at 60 %, 10 % and 5 % off.

**Merchant Steel.**—The large contracts for cheap Steels are now out of the way, but manufacturers requiring higher grades for their use will soon be in the market. The Plow manufacturers are buying quite liberally at the syndicate price. On the usual grades of Merchant Steel the lines are now being drawn very closely to prevent cutting. It is no longer possible for combination orders to be made up partly of such Steel and partly of other and cheaper goods, so as to make a virtual cut on the Steel. Quotations from store are as follows: Bessemer Bars, 2.30¢ @ 2.40¢; Tool Steel, 8½¢ @ 9½¢; Specials, 13¢ @ 25¢; Crucible Spring, 4.40¢; Open-Hearth Spring, 2.90¢; Open-Hearth Machinery, 2.75¢ @ 3¢; Crucible Sheet Steel, 7¢ @ 10¢.

**Steel Rails.**—Some of the local companies have been able to take enough orders to fill their allotment and will give way to their less fortunate competitors. While business in this line is quite dull at present, the prospects are brightening for next year. Quite a number of railroad officials are regretting their failure to make extensive renewals this summer while rails were cheap. They see the hardening of prices in other Iron and Steel products and look for sympathetic advance in Steel Rails. The manufacturers

of Rails will probably be chary about taking contracts for next year's delivery at current rates. Quotations continue at \$31 @ \$31.50 for small lots, but desirable orders can be placed at lower rates for fall delivery.

**Old Rails and Wheels.**—Old Iron Rails experienced a decided advance last week, with a heavy demand and a short supply to meet it. Sales were made at \$21, \$22, \$22.25, \$22.50, \$23 and \$23.75. At the close of the week some holders were asking \$24 and even \$25, but buyers seemed disinclined to follow the upward movement further. Some brokers cabled to Europe for prices, and were quoted rates equivalent to \$23, f.o.b. Chicago, but for immediate acceptance only. The condition of the market is very uncertain at this writing, some of those directly interested predicting still higher prices, while others are confident that prices will recede to about \$21 or \$22, and remain there for some time. Old Car-Wheels are rather scarce, but some movement in them is reported, sales having been made at \$18.50 @ \$19.

**Scrap.**—An improvement is noted in the demand for Forge, but dealers are not disposed to sell much of their stock at present prices, believing that an advance is impending. Mill Iron has been freely called for. Cast is still quiet. Some demand has been experienced for Borings and Turnings, but Steel has been dull. Dealers offer \$13 @ \$14 for Mixed Country Scrap. Selling quotations for carefully selected are as follows, per ton of 2000 lb: No. 1 Forge or Railroad Shop, \$18 @ \$18.50; Track, \$17.50 @ \$18; No. 1 Mill, \$14.50 @ \$15; Light Wrought, \$10; Horseshoes, \$18.50; Axles, \$23.50; Cast Machinery, \$13.50 @ \$14; Stove Plate, \$11; Cast Borings, \$9; Wrought Turnings, \$11; Axle Turnings, \$13; Coil Steel, \$15; Leaf Steel, \$16; Locomotive Tires, \$16.50.

**Hardware.**—Prices of Heavy Hardware manifest a stiffening tendency, while the demand is also improving. Builders' Hardware, Nuts, Bolts, Washers and other classes of goods are also more active. In Shelf Hardware the improved feeling is of broader scope, taking in houses which had not previously felt the impulse of heavier buying by the retail trade. Surveying the entire field, the demand now seems to be of a general nature, taking in the whole range of staple and seasonable goods.

**Nails.**—Manufacturers' agents report a smaller demand for Cut Nails, partly because they are asking slightly higher prices and partly because the leading buyers have supplied themselves for the present. The attitude of the principal manufacturers of Cut Nails is shown by the following extract of a letter from a Wheeling company to their selling agents here: "You are aware that Nails have been selling entirely too low for some time past, and that there is now a better feeling in all kinds of Steel and Iron goods with an advance in some kinds. We think there will be an improvement in the price of Cut Nails in a short time, and we are not desirous to enter more orders at present. Make no engagements or contracts without first consulting us by telegraph." Jobbers still quote \$2 for Steel Nails, and \$2.50 for Wire Nails. The quotation for Wire Nails is, however, liable to be suddenly changed, as the manufacturers have notified the jobbers that they have advanced the price of large lots to \$2.55, f.o.b. Chicago.

**Barb Wire.**—Trade in this line is stagnant. Jobbers quote 3¢ for Painted, and 3.75¢ for Galvanized, in small lots.

**Pig Lead.**—Transactions have been confined to small lots, for immediate delivery, as the largest buyers covered all

their requirements by heavy purchases during the preceding fortnight. The prevailing price early in the week was 4.30¢, but prices then advanced to 4.50¢, with a possibility of going still higher.

W. S. Kessler & Co., dealers in Manufactured Iron and Steel, 115 Dearborn street, Chicago, have issued a chart showing the cycles in which panics occur, and the years in which good prices may be expected. It is of interest at this time as an upward movement is predicted for three years, beginning in 1888. The cycles are not taken from Benner's Prophecies, but were worked up by an original investigation.

## Pittsburgh.

Office of *The Iron Age*, 77 Fourth Ave.,  
Pittsburgh, August 28, 1888.

The general industrial situation is improving; labor in this district is more fully employed just now than it has been at any time this year, and labor complications are much less frequent of late. Occasionally there is a hitch between employers and employees. River navigation has again been resumed, the effect of which will be to improve general business.

**Pig Iron.**—While the market is strong and prices have further advanced, there was less business reported the past than the preceding week; however, as consumers are pretty well stocked, having bought enough to cover their requirements for from 30 to 90 days to come, it is not strange that there has been a falling off in demand. Furnacemen generally are pretty well sold ahead and there is but little offering. There is an evident disposition in some quarters to boom the market; considerable Iron is held on speculation, and this will be unloaded just as soon as the holders thereof can satisfy themselves that the highest point has been reached. They could sell now at a profit of from \$1 to \$1.50 per ton, but some of them think the market is destined to go still higher, hence they are not yet prepared to unload. Some furnacemen are confident that prices will go still higher but there are others whose judgment is worthy of as much consideration who are not so confident. It is well known that the raw article is much higher relatively than the products, and unless the latter be pushed up the former will have to go back. We quote prices as follows:

Neutral Gray Forge.....	\$14.75 @ \$15.50, cash
All Ore Mill.....	16.00 @ 16.50, "
White and Mottled.....	14.00 @ 14.50, "
No. 1 Foundry.....	17.00 @ 17.50, "
No. 2 Foundry.....	16.00 @ 16.50, "
No. 1 Charcoal Foundry.....	23.50 @ 24.00, "
No. 2 Charcoal Foundry.....	21.50 @ 22.00, "
Cold Blast Charcoal.....	25.00 @ 28.00, "
Bessemer Iron.....	17.25 @ 17.50, "

While some sellers are asking \$18, cash, for Bessemer, there have been no sales reported above \$17.50, cash. No sales of Mill Iron reported above \$15.50, cash, and then only for well-known brands. Foundry Irons continue dull, but an improved demand is looked for later on in the season.

**Muck Bar.**—There is considerable inquiry and prices have further advanced; we can report sales at \$28 @ \$28.50, cash, showing an advance of from 50¢ to \$1 as compared with the prices of the preceding week.

**Manufactured Iron.**—There is an increasing demand for nearly all kinds of Merchant Iron, as there always is when the market stiffens up, as is the case at present. The mills are, therefore, pretty well employed, and likely to be until well on toward the close of the year. Prices may be quoted upon a basis of 1.80¢ @ 1.90¢ for Bars, 60 days, 2 % off for cash for first quality Iron.

**Nails.**—There is no improvement to note in the Nail trade. Our Pittsburgh manufacturer are still holding for card

rates, and refusing to sell for less, but from the fact that they are getting very few orders it is evident that buyers are able to do better elsewhere. It is reported that makers west of Pittsburgh are selling as low as \$1.80 and even \$1.75. Makers here say that rather than cut under the regular card rates, which afford a very small margin for profit, they will let their factories stand still.

**Wrought-Iron Pipe.**—This important branch of the Iron business continues in an unsettled and unsatisfactory condition, and there is not much prospect of any substantial improvement soon. While some of the mills are reasonably well employed others are standing idle, and, while prices have stiffened up somewhat in consequence of increased cost of Pipe Iron, they are still irregular and unremunerative. It is difficult to quote prices accurately: Discounts on Black Butt-Welded may be quoted at 55% off regular list; on Galvanized do., 47½%; on Black Lap-Welded, 65%; on Galvanized do., 52½%; Boiler Tubes, 65% and 5% off.

**Old Rails.**—There is a continued active demand for Old Iron Rails, with light offerings. Since our last report there has been an advance of \$1 @ \$1.50 per ton, and there is no assurance that the highest notch has yet been reached. We can report sales of American Tees at \$23 @ \$23.50. Present prices will almost let foreign Rails come into this market from the seaboard, but it is expected that the latter will also advance. The stock of American is steadily being reduced, and as there are no new ones being made they will soon be a thing of the past.

**Billets, &c.**—There is a steady demand for Bessemer Steel Billets, and the market may now be quoted steady at \$29, cash, delivered on cars at makers' works, which is an advance of \$1 ½ ton within the past 60 days. Sales of Rail Crops and Bloom Ends at \$18.50 @ \$18.75. Steel Rails are quoted at \$30, cash, on cars at makers' works.

**Merchant Steel.**—The demand has improved, as it usually does at this season of the year; prices remain unchanged. Best brands Tool Steel, 8½¢; Crucible Spring Steel, 4½¢; Crucible Machinery, 5¢; Open-hearth, 2½¢.

**Railway Track Supplies.**—There is a fair demand for Spikes; no change in prices, 2¢, 30 days, delivered; Splice Bars, \$1.80 @ \$1.90; Track Bolts, \$2.85 with Square and \$2.95 with Hexagon Nuts.

**Old Material.**—There is a good demand for all kinds of Old Material and prices are firmer. No. 1 Wrought Scrap, \$19 @ \$20 ½ net ton; Wrought Turnings, \$13.50 @ \$14; Car Axles, \$23 @ \$24; Cast Borings, \$11.50 @ \$12, gross; Cast Scrap, \$14.50 @ \$15; Old Car-Wheels, \$19 @ \$20.

## Detroit.

WILLIAM F. JARVIS & Co., under date of August 27, report as follows: The strength of the Pig Iron market and the marked advances which have taken place on nearly all grades is an established fact at the present time, although no changes of note have occurred within the past week. Some considerable lots of Lake Superior Charcoal Iron have been placed at full figures. Many of the buyers who postpone their buying until September ordinarily, have been brought to purchasing a few weeks earlier this year owing to the condition of affairs and the strength which the market exhibited. The car works both here and elsewhere seem to have taken a number of new contracts, judging by the inquiries which have been made and orders for Iron which have been placed by them. Old Wheels are strong, but quotations must be nominal except

for small lots, holders declining to part with them, considering their investment in them good for better figures in the very near future. We know of some speculative lots which have been sought for of Lake Superior Charcoal Iron, which heretofore has been a forerunner of better times. We hope the speculators will not forecast the future in error at present. The Mahoning and Shenango valleys producers are very firm at from 50¢ to \$1 per ton higher than the lowest prices of this year. Large amounts of Ore are being moved, causing strong lake freights, but no great advance up to the present time. With a firm market, we make quotations as follows:

Lake Superior Charcoal, all numbers	\$20.00 @ \$20.50
Lake Superior Coke, all ore	19.25 @ 19.75
Lake Superior Coke, cinder mixed	18.00 @ 18.50
Standard Ohio Black Band	19.25 @ 19.75
Southern No. 2	17.75 @ 18.25
Southern Gray Forge	15.75 @ 16.25
Southern Silvery	17.00 @ 17.50
Jackson County (Ohio) Silvery	18.50 @ 19.00
Old Wheels	19.25 @ 20.00

## Cleveland.

CLEVELAND, August 27, 1888.

**Iron Ore.**—Sales of Champion and Republic Ore at \$6 have occurred during the week. Inquiries are almost exclusively confined to high-grade Bessemer Ores, and several instances of such demands having been refused are reported. Particularly is this the case with the better grades of Gogebic Ores, nearly all of the most valuable mines having sold their contemplated output. Fearing additional advances in lake freights, a local dealer is reported to have sold 18,000 tons of non-Bessemer Ore at a price equivalent to \$3.75, f.o.b. cars Cleveland, during the past ten days. Escanaba charters are reported to-day at \$1.10, while the Ashland rate has advanced to \$1.35. The lake and all rail shipments of Ore this season slightly exceed 2,425,000 tons, as against 2,675,000 tons shipped up to a corresponding period in 1887.

**Pig Iron.**—There has been a square advance of \$1 in the price of Mill Iron, \$15 per ton, cash, having been paid during the past week for a round lot at the valley furnaces. Bessemer Irons are also stronger and are held at \$17.25, cash, at the furnace. Standard foundry Irons are so well sold up that offers have been declined. Stocks are gradually decreasing and prices are growing correspondingly firmer. Most of the furnaces have orders enough on hand to keep them engaged for several months, and are indifferent regarding further sales except at an advance of from 50¢ to \$1 per ton.

**Scrap Iron.**—A sale of old Americans at \$22.25—an advance of nearly \$2 per ton over last week's quotations—is reported. There is a good demand for Old Wheels, but sellers are asking prices, considered by purchasers to be out of the question.

**Manufactured Iron.**—Bar Iron has sold at the mill during the past seven days at \$1.70, and inquiries are numerous. Sheet iron, all numbers, is firmer, No. 27 bringing \$3 readily.

## Louisville.

LOUISVILLE, KY., August 27, 1888.

The market continues quiet, no large orders having been placed, but buyers of small lots are in the market, and the aggregate sales amount to a fair week's business. There has been no advance in prices, but the market is fairly holding its own. Furnaces are a little more disposed to meet the demands of their customers for long deliveries, and most of the Southern foundrymen will book orders to run through the next 12 months. It was ex-

pected that Chicago and St. Louis would force the market a notch higher during the past week, but advices from both of these points state business is quiet, so the expected advance has not been realized.

Southern Coke, No. 1 Foundry	\$16.75 @ \$17.75
" No. 2 "	15.75 @ 16.25
" No. 2 ½ "	15.25 @ 15.75
Hanging Rock Coke, No. 1 Foundry	17.25 @ 17.75
Hanging Rock Charcoal, No. 1 Foundry	21.00 @ 23.25
Southern Charcoal, No. 1 Foundry	18.00 @ 18.50
Silver Gray, different grades	14.25 @ 15.00
Southern Coke, No. 1 Mill, Neutral	14.00 @ 14.50
" No. 2 "	13.50 @ 14.00
" No. 1 " Cold Short	13.50 @ 14.00
Charcoal, No. 1 Mill	14.25 @ 15.50
White and Mottled, different grades	12.75 @ 13.25
Southern Car-Wheel, standard brands	23.25 @ 25.25
Southern Car-Wheel, other brands	19.25 @ 21.25
Hanging Rock, Cold Blast	23.25 @ 25.25
Hanging Rock, Warm Blast	19.25 @ 20.25

**Old Wheels** are in active demand, and their scarcity has caused an advance in price of \$1 a ton during the last week. They are now held at \$19.50.

## Chattanooga.

Office of *The Iron Age*, Carter and 9th Sts., CHATTANOOGA, August 27, 1888.

Business men cannot fail to observe the improvement in commercial circles arising from the favorable crop returns that continue to come in from all parts of the South. At this writing it is, of course, impossible to gain a definite comparison of the result of the present year with years gone by, but, from the present outlook, the total yields will exceed those of any previous years. The wholesale merchants located on the trade centers are already buying largely of well-assorted stocks in anticipation of large sales to the interior towns, which the present outlook would seem fully to justify.

**Pig Iron.**—The past week has developed nothing particularly new nor interesting, but the general statement is about the same as it was two to three weeks ago. While there has been no advance beyond prices that prevailed in the early part of the month, yet there is a very firm feeling as to prices. The furnaces are nearly all sold ahead sufficient to make them quite independent whenever an offer is made that is less than the present market figure. The capacity of the stacks and the demand, so far as can be observed, are now very evenly balanced, excepting perhaps with those stacks whose output has obtained a celebrity, who could, without effort, make contracts several months ahead for their entire product at present prices if they were so disposed, but there is much less of this being done now than two or three years ago. The Southern Steamship Association have issued a circular stating that there will be no rate sheet issued for September 1, reaffirming, so far as they are concerned, the rates of August 1, which are on a basis of \$3 to St. Louis and \$2.25 to Louisville and Cincinnati.

## Cincinnati.

CINCINNATI, August 27, 1888.

**Pig Iron.**—The volume of business in the local Pig Iron market during the past week has not been large, but no difficulty has been experienced by producers in disposing of all the Iron offered; in fact, the outlook has been very encouraging to sellers, and the sales made have been very satisfactory. Full prices have been realized, and in not a few instances higher prices have been secured. As a rule, the furnaces are heavily oversold for a month or so at least, and contracts embracing 15,000 tons Foundry Iron have been refused during the past few days. The supply of desirable Mill grades has been light, but apparently less scarce than Foundry Iron at present. In many instances standard

and desired grades not being available and buyers urgent, various other makes have been disposed of. This leveling up process has a tendency to further strengthen the general market. There is some difference of opinion among sellers as to the exact level of the market. This is no manufacture but is of more prominence now than for some time. No. 1 Mill Iron has been sold at \$14.75 @ \$15, 1000 tons selling at the outside rate, shipment cash. No. 2 Mill is nominally quotable at \$14.25 @ \$14.50; No. 1 Southern Coke Foundry Iron has been sold at \$16.25 @ \$16.50, but some holders demand \$16.75, and have sold lower grades in moderate amounts, estimated on this basis. The crops already secured, and those in prospect are larger and better than any harvested in this section for several years. With this fact as a foundation, confidence is growing fast among sanguine business men. The following are the approximate quotations for the local market, cash, f.o.b. Cincinnati:

#### Hot-Blast Foundry.

Southern Coke, No. 1.....	\$17.00 @ \$18.00
Southern Coke, No. 2.....	16.00 @ 17.00
Southern Coke, No. 3.....	15.00 @ 15.50
Ohio Soft Stone Coal, No. 1.....	17.00 @ 17.50
Ohio Soft Stone Coal, No. 2.....	15.50 @ 16.00
Mahoning and Shenango Valley.....	17.00 @ 18.00
Hanging Rock Charcoal, No. 1.....	20.50 @ 22.50
Hanging Rock Charcoal, No. 2.....	19.50 @ 21.00
Tennessee and Alabama Charcoal, No. 1.....	18.00 @ 19.00
Tennessee and Alabama Charcoal, No. 2.....	17.00 @ 18.00

#### Forge.

Strong Neutral Coke.....	14.25 @ 14.50
Mottled Neutral Coke.....	13.00 @ 13.50
No. 1 Mill Coke.....	14.75 @ 15.00
No. 2 Mill Coke.....	14.25 @ 14.50

#### Car-Wheel and Malleable Irons.

Southern Car-Wheel.....	20.00 @ 23.00
Hanging Rock, Cold Blast.....	22.00 @ 25.00
Lake Superior Car-Wheel and Malleable.....	20.50 @ 21.50

**Manufactured Iron.**—There has been a fair volume of business, and a stronger and more confident feeling has prevailed without quotable change in prices. Common Bar Iron, 1.90¢; Charcoal Bar Iron, 2.90¢ @ 3¢; Sheet Iron, Boiled, Nos. 10 to 27, 2.50¢ @ 3.25¢; Sheet Iron, Charcoal, Nos. 15 to 25, 3¼¢ @ 4¼¢ @ lb.

**Nails.**—There has been a fair jobbing demand and a steady market, but supplies are fully ample. Jobbing prices are based upon 12d @ 40d, which sell at \$2 ¢ keg, with 10¢ rebate in carload lots, at mills. Steel Nails sell at \$2 and Steel Wire Nails at \$2.65 @ \$2.75 ¢ keg.

**Old Material.**—All the Old Rails offered in this vicinity have sold readily, and a further advance obtains. There is an active inquiry at the close. Moderate amounts have sold at \$21.50 @ \$22.50 ¢ ton. Old Wheels, too, have met a better demand, but few have been obtainable, and prices are nominal at \$20 ¢ ton, spot cash.

## New York.

Office of *The Iron Age*, 66 and 68 Duane street, (New York, August 29, 1888.)

**American Pig.**—The market continues moderately active, with reports of sales of round blocks for delivery over a series of months and a fair volume of inquiry. The opinion has become general among buyers that it is safe to make purchases for delivery during the balance of the year, but, on the other hand, very few sellers claim that there is any chance for any notable advance. The movement in the West during the past month has relieved a great deal of the pressure put on Eastern markets by eager sellers from the South, the Mahoning and Shenango Valleys, and as they are reported to be supplied with orders, in some cases up to the end of the year, a steady market is looked forward to here. We quote standard Northern Irons, \$18 @ \$18.50 for No. 1 Foundry; \$16.75 @ \$17.50 for No. 2 Foundry, and \$15.75 @ 16.50

for Gray Forge. Freights on Pig Iron from Southern furnaces to Boston have been advanced to \$4.11, net.

**Spiegeleisen and Ferromanganese.**—Spiegeleisen has advanced abroad from 71/ to 73/ for German, yet lots afloat and August shipments are being offered at \$25.75 for German 20 % and \$26.75 for English, with seller's option of brands. In Ferromanganese there has been an advance of 5/ abroad, due to scarcity and higher prices of Ore, and importers are asking \$50.50 @ \$51.50 for 80 %.

**Steel Rails.**—The market continues dull and irregular, only one transaction of 5000 tons for a coal road being reported, and one 1200 ton lot for Florida. In the East very little business is coming up. A good deal of inquiry is in hand for the South, but the great bulk of it is not in such shape that the mills care to touch it. Long time, with bonds as collateral for individual notes of contractors, merchants and promoters are generally the terms offered, the propositions at times bordering on the ludicrous. It is possible that a tide of prosperity may carry such schemes nearer consummation, but for the present they afford little relief to the rail mills. We continue to quote \$28.50 @ \$29 at Eastern mill for standard sections.

**Wire Rods.**—Importations this year are very much smaller than they have been for a long period, American competition on the one hand and the position of the German syndicate on the other having caused the decline. It is estimated that this year the importations of foreign Fence Rods will not be larger than 75,000 to 80,000 tons. In former years the inland German works had the advantage, because our 45 % duty is assessed on the price of the Rods at works. When two German mills one near the shipping port and the other distant from it quoted the same, f.o.b. price, the latter had the advantage. The German syndicate determined to equalize this and adopted a complicated system. From the circular issued in the spring of the current year, when the standard price was 109 marks, we quote:

The following example will explain the calculation of the respective "net at works" price for the different works belonging to the Verband Deutscher Draht-Walzwerke for arriving at the equivalent values f.o.b. Antwerp, including U. S. duty:

#### Remarks.

Y means the f.o.b. price for Phoenix (Standard). Z means the respective "net at works" price. n means the f.o.b. freight from works to Antwerp.

4 marks means the f.o.b. freight from Phoenix-Ruhrort to Antwerp.

Starting from this basis, the following formula is arrived at:

$$Z = \frac{Y - n + 0.45 \times (Y - 4)}{145}$$

Taking the present Standard f.o.b. price for Phoenix—viz., 109 marks less 4 marks freight, or on 105 marks... 105.00  
The f.o.b. Antwerp price, including U. S. duty per 1000 Ks., amounts to... 156.25

The following examples will illustrate the calculation of "net at works price" for Phoenix and other works belonging to the Verein Deutscher Draht-Walzwerke—i. e., Haspe and Schalke:

**Phoenix-Ruhrort.** Marks.  
Present Standard price f.o.b. Antwerp... 109.00  
Freight Phoenix to f.o.b. Antwerp... 4.00  
Price net at works... 105.00  
Add actual freight to f.o.b. Antwerp... 4.00  
U. S. duty 45 % on 105 marks... 47.25  
Total... 156.25

**Krieger-Haspe.**  
Present Standard price f.o.b. Antwerp... 109.00  
Freight Haspe to f.o.b. Antwerp... 7.80  
$$Z = \frac{109 - 7.80 + 0.45 \times (109 - 4)}{145} = 102.38$$
  
Price net at works... 102.38  
Add actual freight to f.o.b. Antwerp... 7.80  
U. S. duty 45 % on 102.38 marks... 46.07  
Total... 156.25

**Boecker-Schalke.**  
Present Standard price f.o.b. Antwerp... 109.00  
Freight Schalke to f.o.b. Antwerp... 5.90  
$$Z = \frac{109 - 5.10 + 0.45 \times (109 - 4)}{145} = 103.69$$

Price net at works... 103.69  
Add actual freight to f.o.b. Antwerp... 5.90  
U. S. duty 45 % on 103.69 marks... 46.66

Total... 156.25

This wonderful system, devised to equalize the price at Antwerp, duty added, is a source of much annoyance to buyers of German Rods. The standard price is now 103 marks, at Antwerp. During the week the sales of Foreign Rods have been light, prices remaining weak at \$39.50 @ \$40, ex-ship.

**Old Rails.**—Under liberal inquiries and short supplies the market has advanced, though too rapidly to allow of much business being done. The only sales reported are one lot of 500 tons a shade under \$23 at Buffalo, a lot of 1000 tons at a shade under \$24 at Youngstown, and 500 tons also for Western delivery at about \$22 on the line of a road in this State. During the past few days \$22 has been bid in vain for Tees, and \$23 for Double Heads. Our market is still considerably below the foreign quotations, held stiff by the fact that Genoa is paying 70/, c.i.f., for Old Rails. The majority of the New England mills are holding at \$24 and \$25, and the bulk of the foreign stock controlled here is held at \$24 for Doubles.

**Swedish Iron.**—The market is quiet with quotations \$53 for Rough Bars \$56 for Rods, and \$60, ex-ships for Store specifications.

**Track Material.**—Spikes are active and stiff at \$2.10 and Angles firm at 1.90¢.

## Metal Market.

**Copper.**—The shorts in London seem to have deemed it advisable to cover, and the market there as a consequence has once more taken a decisively upward turn. Opening on Thursday of last week at £83. 7/6, spot Chili Bars advanced all the way to £86 yesterday, while futures remained steady at £79 and good merchantable brands rose from £74. 5/ to £76; sales aggregated 1820 tons. Here a similar movement took place on a moderate scale for similar reasons, some 125,000 lb August being sold at 16.95¢ @ 17¢, while the later months also ruled higher; 16.80¢ @ 16.90¢ was the quotation for September, 16.50¢ @ 16.80¢, nominally, for the winter. This morning a fresh advance in spot Chili Bars is cabled from London from £86 to £88. 15/, futures at the same time giving way from £79 to £78. 15/, but good brands improving from £76 to £76. 5/, and Best Selected for the week from £76. 10/ to £79. Copper closes firm to-day at 16.90¢ @ 17¢ spot, 25,000 tons August selling at 16.90¢ on the first call. The following dispatch was received from Boston August 24 and 27: "The Boston and Montana mine produced 536,286 lb of Refined Copper the second week in August, against 371,560 lb the first week, and this is the largest week's output yet made. The net profit is about 5¢ ¢ lb, or fully \$25,000 for this one week's work. The Boston and Montana directors will call a special meeting of stockholders to authorize an issue of 50,000 shares of new stock, 10,000 shares to remain in the treasury and 40,000 shares to be given to stockholders at par—\$25. The net profit of the Kearsarge mine for August is over \$6000, and work only began August 15." Rio Tinto shares gave way 17 francs last week at Paris. As per Messrs. James Lewis Son's Liverpool semi-monthly report of August 16, the import of American Copper into Liverpool and Swansea from January 1 to date had been 17,139 tons, Fine, as compared with 6856 tons during the corresponding period of last year.

**Tin.**—Both in London and here the market has been tame and featureless dur-

ing the week, with the tendency downward. London opened on last Thursday at £92. 10/, spot, closing yesterday at £92. 2/6, while three months gave way from £93 to £92. 15/, sales altogether not exceeding 310 tons. Here very little transpired either in a jobbing or speculative way, the quotations ranging as follows: Spot, 20½¢ @ 21½¢, and October, 20½¢. The market in London this morning shows no further change. The closing spot figure to-day in this market is nominally 21½¢, at which the market remains apathetic.

**Tin Plates.**—There is a fair demand springing up for all kinds of Tin Plates, but, so far as Coke Tins are concerned, it cannot be met, owing to an entire absence of stock. In some cases two grades of Charcoal have been substituted. This demand comes almost exclusively from the fruit canners, the oil canners being sufficiently provided with their special size. Futures can be had at a considerable concession on spot rates, which stimulates activity therein all the more. A thing which rarely occurs is to be noted at the present time—viz., that consumption is evidently ahead of production, but this may soon be met by the starting of new works. We quote toward the close, large lines, 3 box, on the spot: Siemens-Martin Steel, charcoal finish, \$4.85 @ \$5.25; Coke finish, \$4.75; Terns, \$4.30 @ \$4.40; Bessemer Cokes, \$4.50 @ \$4.60, and Wasters \$4.20 @ \$4.25; Liverpool is 13/6 with Coke Tin.

**Lead.**—The chief operator has again been actively at work, buying spot and futures right and left, and causing the open market to advance from 4.30¢ on the spot on Wednesday of last week to 4.80¢ last night, some 1400 tons changing hands, and the latter figure being firmly held at the close. While this was the case in the open market, activity was quite as great on 'Change. Consumers meanwhile remained passive lookers on, not buying anything to speak of. Some 1600 tons of Lead were sold on the Metal Exchange, the interest centering on deliveries up to the end of October, at rising prices, carrying the latter from 4.45¢ August to 4.87½¢ September, October to 4.85¢ and November to 4.65¢. In London Soft Spanish has remained steady during the week at £13. 2/6, while English Pig rose from £13. 5/ to £13. 7/6. St. Louis is firm at 4.60¢.

**Spelter.**—The situation out West has lost nothing of its strength during the week. Here but little has transpired, Common Domestic not being obtainable for less than 5¢. In London Silesian advanced from £17. 5/ to £17. 10/, and has now to be quoted 5.55¢ nominally here.

**Antimony.**—Hallett has recovered in London from £38 to £39. Here only a moderate jobbing trade has been transacting at 9½¢ Hallett and 13½¢ Cookson.

#### New York Metal Exchange.

The following sales are reported:

THURSDAY, August 23.	
116 tons Lead, August.....	4.40¢
32 tons Lead, August.....	4.45¢
FRIDAY, August 24.	
25,000 lb Copper, January.....	16.50¢
100 tons Lead, August.....	4.00¢
SATURDAY, August 25.	
30 tons Tin, August.....	31.00¢
MONDAY, August 26.	
100 tons Lead, September.....	4.65¢
100 tons Lead, spot.....	4.70¢
48 tons Lead, September.....	4.72½¢
48 tons Lead, September.....	4.70¢
25,000 lb Balto. Copper, August.....	15.45
100 tons Lead, August.....	4.75¢
100 tons Lead, September.....	4.75¢
16 tons Lead, September.....	4.80¢
32 tons Lead, September.....	4.77½¢
32 tons Lead, October.....	4.77½¢
96 tons Lead, November.....	4.65¢
TUESDAY, August 28.	
50 tons Lead, October.....	4.80¢
25,000 lb Copper, August.....	16.95¢
100,000 lb Copper, August.....	17.00¢
100 tons Lead, October.....	4.80¢
10 tons Tin, October.....	20.50¢

116 tons Lead, October.....	4.80¢
100 tons Lead, October.....	4.65¢
50 tons Lead, October.....	4.80¢
100 tons Lead, September.....	4.80¢

### Financial.

The sensations of the week were extraordinary speculative transactions in wheat, which on a single day made an aggregate of nearly 35,000,000 bushels, and President Cleveland's message relating to trade with Canada and calling for an enforcement of the Retaliation act of March, 1887. The latter, although of deep interest to politicians, was not seriously regarded in business circles. Encouraged by the excellent outlook for crops, good progress has been made in opening the fall trade, and it is observed that despite the conservatism ruling in all departments—as shown by cautious buying—the general trade of the country in July and August compares well in volume with that of former years. Among dry goods jobbers in New York the market has been full of buyers from all sections of the country, with the result of increased shipments and a hardening tendency in prices. Sales are believed to differ little in amount from those of last year for a corresponding date. Wheat advanced 5½¢, but has fluctuated on conflicting reports. Corn and oats also advanced a fraction, despite favorable accounts from the West. Cotton has been lower, but spots advanced ¼¢ on Monday. Coffee, sugar, and other leading staples, are firm.

The Stock Exchange markets were dull and irregular until Monday, when they became active and higher, influenced principally by higher prices in London. The most active were Reading, St. Paul, Lackawanna and Western Union. Lackawanna scored the best figures for two years. All the leaders were strengthened by the advance in the prices of Coal announced on Friday. The only perceptible effect of the President's message was a decline of about 1% in Canada Southern and Michigan Central. In London the cables showed that there was some uneasiness, but, after an interval, selling orders were withdrawn. United States bonds are quoted as follows:

U. S. 4½s, 1891, registered.....	100%
U. S. 4½s, 1891, coupon.....	107½
U. S. 4s, 1907, registered.....	128½
U. S. 4s, 1907, coupon.....	128½
U. S. currency 6s.....	120

The Washington crop bulletin for the past week states that the weather has been especially favorable for harvesting in the Northwest. The wheat harvest progressed rapidly in the central and northern portions of Dakota and Minnesota, from which region the reports indicate that the damage to the wheat crop from the frosts of last week was largely overestimated. In the northern portion of the corn belt the weather was favorable, but the growth of the plant was retarded by the low temperature. The St. Paul *Pioneer Press* summarizes the crop situation by saying that the wheat yield in Minnesota and Dakota will be fully as large as was expected. Reports from nearly all parts are favorable to a large yield of oats. The Cincinnati *Price Current* says that "outside of some districts in Southern and Western Kansas there is continuance of an almost uniformly good promise for corn. The latest sales comprise 96,000 bushels at \$1.03½ for Manitoba spring; \$1.07 @ \$1.08 for No. 1, hard, afloat, spot and to arrive, and \$1 for No. 2 red, in elevator. Cash corn is quoted 53½¢ for No. 2 mixed, afloat, and 58¢ for No. 2 white, delivered in September. Provisions are stronger.

The cotton crop of Texas is now estimated at 1,500,000 bales, and with favorable weather may extend to 1,900,000 bales. Last year it amounted to 1,400,000 bales.

The weekly statement of the associated banks showed a further decrease in sur-

plus reserve, equal to \$732,825, reducing the excess to \$21,003,425, but this item is still maintained far above the records of the last two years. The banks were somewhat depleted of funds by the demand from the interior, but much below expectations, which is attributed partly to dullness in the pork-packing trade, but bankers look for a more urgent demand for money at an early day. In loans there was a further expansion of \$839,900. Deposits decreased \$3,499,900, and circulation increased \$55,800. Rates for money are practically unchanged. Commercial paper is fairly active. In the West the demand for funds is variable, according to locality.

Harvey Fisk & Sons, heavy dealers in Government bonds, have issued a circular, calling attention to the "great peril" arising from the Treasury surplus. Since the Secretary of the Treasury commenced to purchase with surplus money in April last, he has, by official statements from the Department at Washington, purchased, up to August 21, \$33,601,150 4s and 4½s, on which he has made a saving to the people in future interest payments of upward of \$12,000,000. The circular argues that the existing surplus should be expended in the same way, thereby effecting a saving of \$40,000,000 more in future interest payments, and he expresses the opinion that the bonds could be bought at prices which would effect this saving.

The Gansevoort Bank was organized with \$200,000 capital and will locate near the new market. The president is Timothy C. Kimball, and Charles E. Bigelow, of the Blake & Knowles Steam Pump Company, is vice-president. A bank for the hat and clothing trade is being organized with a capital of \$250,000, and Jos. W. Conron, of the firm of E. V. Connett & Co., is spoken of for the presidency.

Sterling exchange is inactive and barely steady. The London *Economist* speaks of the continued demand for gold for South America and the large stocks of metal held by the banks of France and Germany, but as the latter will hardly care to part with much gold the Bank of England will be compelled to advance its rate again if withdrawals are made.

As the month of July began the new fiscal year the course of our foreign trade, as shown by the statistics from Washington in a comparison with former seasons, is watched with eager interest. The statement now at hand shows that the exports for the month, including the large shipments of specie, have not fallen much below the corresponding figures of last year, which was not a promising season, but the imports have gained \$2,500,000, thus increasing the balance of trade against this country. Taking the merchandise alone, excluding the precious metals, we find that the exports were only \$45,267,938, against \$49,395,912 for July of last year, and the imports were \$61,329,461, against \$56,593,226, leaving a balance of trade against this country, exclusive of specie, of \$16,061,523 for the last month, against only \$7,197,314 for July of the preceding year. In July of last year we gained over \$2,000,000 in specie; but in July of this year we lost \$3,500,000 in gold and silver. For the seven months in 1888 we have an excess of imports amounting to \$55,500,000, while for the first seven months of 1886 we had \$37,500,000 excess of exports, making a change in the comparative balance of trade of \$93,000,000.

### Coal Market.

The Anthracite Coal trade continues active at firm prices, and the volume of trade is almost without precedent, but the producers seem to have slackened a little dur-

ing the past week, the total output having dropped to 832,058 tons, a decrease of 89,000 tons compared with the previous week, but still far above the usual average. Compared with the corresponding week last year there is an increase of 104,000 tons. Since January 1 the aggregate is 23,092,621 tons, an increase of about 1,000,000 tons compared with the same time in 1887. For four weeks the comparison is as follows:

	Tons.
Week ended August 4.....	754,883
Week ended August 11.....	831,615
Week ended August 18.....	920,922
Week ended August 25.....	852,058

In accordance with the action taken by the sales agents last Friday, as foreshadowed in these columns a week ago, the September price for Free-burning Anthracite at the mines will be as follows: Broken and Egg, \$2.65; Stove and Small Stove, \$2.90, and Chestnut, \$2.65 @ \$2.75. Pea Coal was left unchanged at \$1.25, and Furnace Lump at \$2.25. These new prices are 10¢ per ton higher for Broken and 15¢ for Egg, Stove, Small Stove and Chestnut sizes than the figures which have been ruling for several months past. Including tolls, this is equivalent to about 25¢ advance per ton all round.

September prices are as follows:

Hard, Broken.....	\$4.30
“ Egg.....	4.40
“ Stove.....	4.65
“ Chestnut.....	4.55
Free-Burning, Broken.....	3.95
“ Egg.....	4.30
“ Stove.....	4.65
“ Chestnut.....	4.55

Pea has sold as low as \$2; ruling price, \$2.25 @ \$2.35.

The several companies are said to have no lack of orders, but complaint is general of delay in shipments.

The Bituminous trade steadily increases in volume and prices are reported pretty firm on the better grades. The pool prices remain \$3.25 f.o.b.

The Reading output for the work ending August 25, was 205,000 ton, of which 12,000 were sent to Elizabethport. The Pennsylvania carried for the week ending August 18 219,680 tons of coal, and the increase since January 1 is 807,000 tons compared with last year.

## British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, August 29, 1888.

Events in the Copper market the past week strongly suggest that the syndicate has virtually succeeded in gaining complete control. English smelters who, apparently, have been left to shift for themselves experience an increased demand for their product, and Best Selected has advanced about £2 in consequence. The recently introduced G.M.B. contracts seem to be as closely controlled as are Chili Bars, and the “outside” supplies, by all accounts, are virtually exhausted. This condition of affairs naturally forces buyers to go to headquarters for supplies, and Chili Bars have been more eagerly bought there by consumers this week than at any previous time. The masters of the situation have shown the former derelicts no special consideration. To the contrary, these buyers have been allowed to run the price up on each other. Meanwhile the screws tightened almost automatically upon “short” sellers’ contracts on which deliveries are due this month and next. The result of the conditions noted is reflected

in an advance to £88 for Chili Bar prompts; £83 for Chili Bar futures, and £76 for G.M.B. contracts.

The price of Pig Tin has gradually softened, although still receiving a certain degree of support from the “bull” interest. It is stated that the shipments from the Straits will be heavy during the next 30 days, and also that colonial holders have shown some evidence of inclination to realize on at least a portion of their stocks. Still it is apparent that efforts are not spared to hold prices up while the endeavor is made to accomplish their purpose, and the “bear” interest have therefore gained but slight advantage. Outside speculation in the metal has been small during the week, and the alleged support from the American market reported a short time ago seems to be missing at the present time.

The position of the Tin-Plate market is still very strong. There continues to be a brisk demand for both near and distant future deliveries. Makers are so far sold that only a moderate amount of the demand for early shipments can be accommodated, and in most cases they are reluctant to enter orders for more distant deliveries at present prices. Steels are still in relatively the greatest demand. Shipments are running very heavy. A new Black Plate mill is soon to be started at Pontypool.

The Scotch Pig market shows a continued hardening tendency, and on the Middlesboro’ product and Hematites the same is to be remarked. Speculation has figured less conspicuously than heretofore in shaping the course of the market. Increased demand from consumers is now the main basis of strength. In the Scotch trade American demand is also figuring somewhat prominently as an influence. Makers’ brands have advanced 6d. @ 1/; Middlesboro’ is 9d. and Bessemer Pig 6d. higher.

The Steel trade, with some few exceptions, is brisk and large orders are reported placed in some branches. The Scotch makers are said to be specially active and one firm is reported to have booked an order for 1000 tons Boiler Plate. Rails, Blooms and Rods are exceptional, and the prices on these are barely maintained.

The Manufactured Iron branch also continues brisk, with noticeable activity among the makers of Plates. Staffordshire Common Bars have been sold at 5/ advance and Black Sheets at 2/6 advance.

Old Iron Rails are firmer and in more active demand, with considerable inquiry from America reported.

**Scotch Pig.**—The market has continued active and prices are higher:

No. 1 Coltness, f.o.b. Glasgow.....	40/
No. 1 Summerlee, “ “.....	43/6
No. 1 Gartsherrie, “ “.....	46/9
No. 1 Langloan, “ “.....	46/9
No. 1 Cambro, “ “.....	42/6
No. 1 shorts, “ at Leith.....	46/6
No. 1 Glenarnock, “ Ardrossan.....	44/9
No. 1 Dalmellington, “ “.....	41/6
No. 1 Eglinton, “ “.....	41/
Steamer freights, Glasgow to New York, 6/;	
Liverpool to New York, 7/6.	

**Cleveland Pig.**—There has been a further advance with active trading; No. 1 Middlesboro’, G.M.B., 36/6; No. 3 do., 34/.

**Bessemer Pig.**—The market firm at 6d. advance and fairly active. West Coast brands, mixed numbers, 44/6, f.o.b. shipping point.

**Spiegeleisen.**—Good business passing at steady prices. English 20 % quoted 80/, f.o.b. N. W. England shipping point.

**Steel Rails.**—Demand has been rather slow. Standard sections quoted at £3. 17/6, f.o.b. at N. W. England shipping point.

**Steel Blooms.**—No change in the market for these. We quote at £3. 12/6 for 7 x 7, f.o.b. at N. W. England shipping point.

**Steel Billets.**—Business very fair at steady prices. Bessemer, 2½ x 2½ inch, £3. 17/6, f.o.b. at N. W. England shipping point.

**Steel Slabs.**—Very little doing, and prices rather weaker. Bessemer, £3. 15/, f.o.b. at N. W. England shipping point.

**Steel Wire Rods.**—The market is without change. Mild Steel No. 6 quoted at £5. 16/ and No. 5 at £5. 14/, f.o.b. at N. W. England shipping point.

**Old Rails.**—Demand fairly active and prices firm. Tees quoted at £2. 15/, and Double Heads £2. 17/6, free on board.

**Scrap Iron.**—Trade moderate at about former rates. Heavy Wrought quoted at £2. 5/, f.o.b.

**Crop Ends.**—Business slow and at unchanged prices. Bessemer quoted £2. 5/ @ £2. 7/6, f.o.b.

**Tin Plate.**—The market remains very firm. We quote, f.o.b. Liverpool:

IC Charcoal, Allaway grade.....	15/ @ 15/6
IC Bessemer steel, Coke finish.....	13/3 @ 13/6
IC Siemens “ “.....	13/6 @ 13/9
IC Coke, B. V. grade.....	13/ @ 13/6
Charcoal Terne, Dean grade.....	13/ @ 13/3

**Manufactured Iron.**—The market continues strong and active. We quote, f.o.b. Liverpool:

Staff. Ord. Marked Bars.....	£ s. d. @ 7 10 0
“ Common “.....	@ 5 0 0
“ Bl’k Sheet, singles.....	@ 6 17 6
Welsh Bars (f.o.b. Wales).....	4 12 6 @ 4 15 0

**Tin.**—Steady, with a fair business. Straits quoted at £92 @ £92. 5/, spot, and £92. 10/ @ £92. 15/ for three months’ futures.

**Copper.**—Market strong and active. Chili Bars, £88 @ £88. 5/, spot, and £83 @ £83. 10/ three months’ futures. Best Selected, £78. 10/ @ £78. 15/.

**Lead.**—Steady market; demand fair. Soft Spanish, £13. 2/6.

**Spelter.**—Market continues very strong. Silesian, ordinary, £17. 7/6 @ £17. 12/6.

## Hardware, Machinery, &c.

Barbour Bros. & Co., Mach’y, pkgs., 11  
Beniger Bros., Hdw., pkgs., 45  
Boker, Carl F., Mdse., cs., 2  
Boker, Hermann & Co., Mdse., cs., 22; Arms, cs., 42  
Brown, T. J., Tram Cars, Wheels, Axles, &c., cs., 30  
Cheeseborough & Co., Tin Tubes, bales, 2  
Doige, Alfred, Mdse., cs., 7  
Field, Alfred & Co., Arms, cs., 16; Caps and Wads, cs., 32  
Folsom, H. & D., Arms, cs., 2  
Graef Cutlery Company, Cutlery, cs., 9  
Hawland, S., Bruseware, cs., 1  
Lau, J. H. & Co., Arms, cs., 17  
Merchants’ Despatch Company, Mdse., pkgs., 74; Arms, cs., 22  
Reux, C., Hdw., cs., 1  
Schoverling, A., Arms, cs., 45  
Shoverling, Daly & Gales, Arms, cs., 49  
Ward, Jas. E. & Co., Mach’y, bxs., 3; do., pkgs., 386  
Wiebusch & Hilger, Lim., Arms, cs., 7; Cutlery, cs., 6  
Witte, John G. & Bro., cs., 8  
Order: Brick Presses, pkgs., 9

The steamer Umbria made her last trip out in 6 days, 6 hours and 14 minutes to Brow Head, easily beating the new Inman liner City of New York.

## Hardware.

The trade for the month is winding up in a quiet manner and without any feature of particular interest. It is not probable that the business for the month will aggregate very large or turn out as well as was expected at the beginning, but we hear no great complaints, and a good fall trade seems to be generally expected. Manufacturers are running full and apparently making up stocks with confidence, but are cautious about placing orders for materials to cover any very long period.

### Barb Wire.

A little more business is doing in the New York market, occasional orders for carload lots being taken, which we quote 3.9 to 4 cents for Galvanized. The crop outlook is giving encouragement to manufacturers, and the belief is expressed that should the good prospects now before the farmers be realized a growing demand would soon end the demoralized condition of the Barb Wire trade in the West.

### Cut Nails.

The New York market is moderately active, with prices a shade firmer. There is but little cutting of the new schedule of extras. We quote \$1.85 @ \$1.90 for carload lots on dock, and \$1.90 @ \$1.95 for small lots from store.

### Wire Nails.

At the meeting of the Western Wire Nail Association, held at Cleveland last week, prices on Standard Wire Nails were advanced to \$2.65, less 10 cents per keg, in lots of 240 kegs. For miscellaneous Nails the discount on less than 1 ton lots is 70 and 10, and for larger quantities 70, 10 and 5, for Cincinnati, Chicago and East St. Louis delivery, the terms being acceptance 60 days or 10 per cent. off, ten days. Since then the market has stiffened here, the majority of sellers asking \$2.55 for carload lots and \$2.65 for store lots, at New York. Another meeting of the Wire Nail manufacturers is to be held at Pittsburgh to-morrow to discuss plans submitted.

During the session of the Fork and Hoe makers, at Rochester, the manufacturers of Scythe Snaths also held a meeting and perfected an organization with a view to controlling the prices of their goods. The result of the meeting was that a discount of 50 per cent. was adopted as the price to the general trade, with extra discounts for quantities. The terms are 60 days from March 1, or 2 per cent. discount for cash in 10 days. Deliveries are the same as those governing the distribution of Forks and Hoes. In other words, it is an equalization of freights between the different makers.

An expectation seems to exist in some quarters that an advance in Shot is likely to take place on account of the increasing price of Lead, which has advanced considerably since the recent change in the price of Shot.

A. W. Paine, Peabody, Mass., will in future make four sizes of the Peabody Door Springs, of which the trade prices are as follows, with discounts for large lots:

No. 1, for screen doors.....	\$1.25
No. 2, for house doors and heavy screen doors.....	1.25
No. 3, for store doors.....	1.50
No. 4, for heavy store doors.....	2.00

The Covert Mfg. Company have issued the following revised discount sheet:

	Dis. per cent.
Loop Harness Snaps.....	50
Round Eye Snaps.....	60&10
No. 38 Round Eye Snaps.....	50&10
"New" Loop Harness Snaps.....	50&5
"New" R. E. Harness Snaps.....	60

Martingale Loop Snaps.....	50
Snap and Thimble.....	60
"New" Snap and Thimble.....	60&10
Thimbles.....	60&10
Round Eye Swivel Snaps.....	60
Loop Swivel Snaps.....	60
Heavy 1 in. Swivel Snaps.....	60
"Giant" Open Eye Snaps.....	35
Open Eye Snap.....	60&10
"New" Open Eye Snap.....	50
Double Snaps.....	50
Combined Bit and Snaps.....	35
Leather Horse Tie.....	35
Strap Eyes.....	50
Horse Ties, Snap and Thimble (Jute).....	60&10
Horse Ties, Snap and Thimble (Hemp).....	50
Cattle Ties, Snap and Thimble (Jute).....	60&10
Cattle Ties, Snap and Thimble (Hemp).....	50
Horse Tie, "New" Snap and Thimble (Jute).....	60&20
Cattle Tie, "New" Snap and Thimble (Jute).....	60&20
Lariat Tether.....	50&10
Horse Pins.....	60
Picket Pins, O. K., (Jute).....	60&20
Cattle Tie, O. K., (Jute).....	60&20
Web Horse Tie.....	50
Rope Halter, 1/4 inch, (Jute).....	50
Rope Halter, 1/2 inch, (Hemp).....	50
Rope Halter, 7-16 inch, (Jute).....	60&10
Adjustable Rope Halters.....	40
Halter Leads (Hemp).....	50
Halter Leads (Jute).....	60
Halter Leads (Jute) "New" Snap.....	60&10
Halter Leads, 3/4 inch.....	60
Gentlemen's Hitching Cord.....	25
Weight Cord.....	35
Hitching Weight.....	50
Driving Reins.....	40
Hammock Ropes.....	60&20
Flexible Curry Comb and Sweat Scraper.....	35
Balling Iron.....	35
Adjustable Web Halter.....	35
Web Halter.....	35
Bull Leads.....	35
Bull Snap.....	35
Soldering Irons.....	35
Soldering Coppers.....	50
Bristle Card.....	35
Hitching Post.....	35
Rod Post Hitcher.....	60&20
Stallion Chain.....	35
Cart Breeching End Irons.....	25
Cart Breeching Chains.....	25
Halter Chain.....	60
Rein Chain.....	60&20
Breast Chain, Short Snaps.....	50
Lengthening Snaps.....	35
Open Eye Breast Chain Snap.....	35
Breast Chain, Long Snap.....	50
Post Chain.....	60&20
Breast Chain, New Patent.....	50
Center Breast Chain Snap.....	35
Wheelbarrow Wheels.....	25

Our Louisville correspondent writes us as follows:

The jobbers in the Hardware trade make varying reports the past week. The extraordinarily heavy rains have had some bad effects on trade, especially down in the Cotton belt. The salesmen traveling in that part of the country say the merchants who have been often hurt by a little overbuying in bad crop years were afraid the cotton would be injured, making them quite wary for the present. Consequently those dealers who strive for this business particularly find it dull. Others report the heavy demand of last week to continue, and in some lines to increase. Bar Iron has been very quiet, little is offering from the mills and limited amounts are going into consumption. Heavy miners' and contractors' supplies continue in good demand. One house handling largely of these goods makes a point of carrying in stock every article enumerated in their catalogue, which fact brings its own reward. Those jobbers making a specialty of Wagon and Carriage goods say that trade was never better—in fact it is quite large enough to handle satisfactorily. The Hub and Spoke factories are all running full.

We are informed that Mr. E. Bertram Pike, who has represented the A. F. Pike Manufacturing Company on the road for the past two years, has associated himself with Mr. C. O. Danforth, of Boston, under the style of Danforth & Pike, manufacturers' agents. Mr. Pike will start upon his fall trip about September 1, still representing the A. F. Pike Manufacturing Company and several other well-known Hardware manufacturers.

Hartley & Graham, 17 and 19 Maiden Lane, New York, having purchased the entire stock of Colt's New Line 30-caliber and Colt's Old Model 22-caliber Revolvers, offer them at a very large reduction in price. They are all regular standard goods.

We have before us Sargent & Co.'s new catalogue, which is a handsome volume of 1100 pages, bound in cloth sides, red leather back, and of convenient size for handy use. About three-fourths of the book are devoted to their own manufac-

tures, everything up to page 858 being made at their New Haven factories. The remaining pages are taken up with miscellaneous Hardware and Tools, the goods shown being all regularly kept in stock. The first 240 pages are devoted to their line of Locks, of which about 50 pages are given up to new goods, among which a greatly increased line of Bronze Metal Door Knobs is particularly noticeable. A frontispiece gives a view showing the present extent of the works, including the new Lock factory, which is the latest addition, and will enable those who can compare this with the view of the works previously published to appreciate the additions which have been made to this establishment. The catalogues issued by Sargent & Co. are noted for the clear, compact and convenient manner in which they are arranged, and the volume before us is another conspicuous example of the same qualities, which are carried still further than in its predecessors. The arrangement of cuts and type is made with a careful view to the convenience of the trade in using the book, as well as with an eye to artistic effect, and with such success that we do not know of any book which excels it either in beauty or convenience. The mechanical part of the work is thoroughly well done, and it is printed on paper which makes a very good appearance, while it is thin enough to keep the thickness of the volume within reasonable bounds. This book is now ready for delivery, and will be sent to customers with the first lot of goods ordered, or, if desired, expressed to their address.

C. M. McClung & Co., Knoxville, Tenn., have added to their stock of Hardware and Cutlery a line of Stoves, Ranges, Grates, &c., of which they issue a handsome pamphlet.

The new catalogue of Tower & Lyon, 95 Chambers street, New York, is about double the size of their previous one. It is handsomely printed and very neatly bound in flexible cloth, with red edges. We notice that they have added to their assortment of Iron and Wood Bottom Planes until they now make some 75 numbers. They have increased their line of Tools, illustrating their Excelsior Expansion Bit and Wood's Extension Level, also the Stephen's Vise, of which they obtained control last year. They have dropped some items given in a former catalogue and are becoming more and more manufacturers of high-grade Tools. They illustrate a very full line of Police Equipments, with which Mr. Tower has been so long identified.

Under date of 25th inst. C. Sidney Shepard & Co., 23 and 25 Randolph street, Chicago, Ill., issue a fall circular which is principally devoted to seasonable goods.

The St. Louis Vise and Artesian Well Tool Company, St. Louis, Mo., manufacturers of Well-Drilling Machinery and Tools, issue their catalogue C. This company supply everything necessary for boring wells to any depth, and will furnish experienced operators, if required, to go to any part of the country. They have enlarged their facilities for turning out work and are now prepared to execute orders with dispatch.

Hibbard, Spencer, Bartlett & Co., Chicago, Ill., have issued price list No. 100, which is devoted to Firearms, Ammunition, &c.

Price List No. 123 has just been issued by the James L. Haven Company, Cincinnati, Ohio, giving revised prices of their goods up to date.

The Hartman Mfg. Company, Beaver Falls, Pa., have issued their first catalogue, giving illustrations, descriptions, price lists and testimonials of their patent orna-

mental and field Fencing. This catalogue is extremely well gotten up for the purpose, giving a great deal of valuable information to persons interested in this line.

S. Freeman & Sons Mfg. Company, Racine, Wis., have issued their first illustrated catalogue and price list of the Freeman Ensilage and Feed Cutter, containing illustrations, full description and prices. It also contains a treatise on Ensilage and Silos, which will give it additional value.

Parkhurst & Wilkinson, 148-164 Kinzie street, Chicago, Ill., issue circulars stating that they are prepared to furnish Sweet's Toe Calks, both sharp and blunt. They quote discount 40 per cent. to merchants, provided they do not sell to smiths at better than 30 per cent. The list prices remain the same: Swedish, 13 cents; American, 11 cents; Bessemer, 9 cents.

Buck Br. s., Millbury, Mass., desire us to make public the following regarding the annoyance which they have suffered from the substitution of inferior goods:

A number of our customers in the Southwest have complained to us that they have been imposed upon by an unprincipled drummer who claimed to be selling "Buck Bros." goods. These merchants say "they gave their orders expecting to receive our goods, but found on opening the packages that they had got goods of an inferior make and brand." To all such merchants we beg to call attention to our standing advertisement in *The Iron Age*, which cautions "buyers to be on their guard and not have inferior goods palmed on them by unprincipled persons, who represent them as our make." All our tools are stamped "Buck Brothers" in full, and our trade-mark is on all our labels. None others are genuine.

In the *Sacramento Daily Record-Union* we find the following, which will interest the friends of a gentleman who is perhaps as widely known as any one in the trade:

Among other arrivals in Sacramento yesterday was Col. Harry Comstock, a gentleman who enjoys the reputation of being perhaps the best-traveled commercial man on the Continent. He has spent years in India, China, Egypt and other far foreign lands while pushing American manufactures to the front, and is better known among the nobility in those distant lands than many of our diplomatic agents, as his dealings have always been with Government officials. It is owing largely to Colonel Comstock's energy and business abilities that American-made arms are so largely used in the armies of China, Japan and other foreign lands, as it is in this department of commerce that his talents have been usually employed. Since then Colonel Comstock has established himself at Syracuse, N. Y., as one of the firm manufacturing the New Baker Fowling Piece. His long experience as a commercial traveler, he says, had convinced him that a great demand existed for a Gun that would equal in shooting qualities and durability the higher-priced Arms and at the same time be within the reach of sportsmen of moderate means, and this demand he claims his firm are now engaged in supplying. Having placed some orders here, Colonel Comstock departed for San Francisco, whence he will go through Texas, New Mexico and the Southern States, and will be in Sacramento again in the spring.

The new works of the Hartman Mfg. Company, at Beaver Falls, Pa., manufacturers of Patent Steel Picket Fence and Gates, and Corduroy and Diamond Fencing, are now in full operation and with the addition of two new fence machines, the firm have been enabled to catch up with their orders. The new machines are built especially for the manufacture of the Farm or Field Fence, which is the latest novelty brought out by the firm. This Fence is to compete with the wood slat picket fence which has had such a large sale through the West.

#### Dealers of Different Type.

In a recent issue of one of our exchanges appeared an article in which two types of dealers were described. One was designated as a man happy and contented, with plans outlined for the future and successful in this business; the other, nervous, irritable and gloomy, disagreeable to his

customers, and unable to give proper attention to those details which render a business profitable. The article sets forth the reasons for the conditions existing in both cases, and as it is of general interest to the retail store trade we take pleasure in republishing it herewith.

We have in mind a bright-eyed, rosy-cheeked business man, far past the noon meridian of life, but who seems as yet to be but a young man in tastes, habits and thought. You go into his store to call on him, and you are greeted with a pleasant word, a cordial handshake and an easy chair. He will sit down with you as if he did not have a large business depending entirely upon him for its successful operation. He looks you square in the eye and makes you feel perfectly at ease in his presence. He dismisses business entirely if you are making a social call, or he transacts business with you in a charmingly open, free-hearted manner that wins you at once to his long list of friends. He jokes with you about his age, says his life is not nearly spent yet, does not fear to die, has no pressing obligations, has good credit, can buy any amount of goods he needs without being questioned, because his credit has long been established. He gives an hour or so to you without appearing to feel that you have robbed him of an expensive article. He invites you to his house to dine with his family. He preaches to you of contentment and happiness, and is a living illustration of his text. He romps with his children, who meet him at the gate. He kisses his wife, who has the same contented smile, and his mother rises up and calls him blessed. He tells you, when you have enjoyed dinner, and are sitting out in the shade for a quiet smoke, why this is all so. To sum up the whole of his talk is one brief sentence: He is living six months ahead. He plans for the future; borrowed money when starting in business for six months, and paid it back at the expiration of three; bought goods on three months' time and paid in thirty days, and thus established his credit; gathers money together to conduct his business through six months' bad weather, bad trade, and bad markets, and keeps it there. He has a reserve capital, a reserve fund of good nature, capability and happiness. He dates all his calculations six months ahead, and is ready to carry them out when they mature. He has his life insured, his property insured, and his will made in due form. In a word, he is always ready. Do you know him?

We know a man who is nervous and irritable; his mouth is drawn into hard, set lines. Gridiron wrinkles furrow his forehead; his fingers are constantly winding about each other when disengaged. When you go into his place of business you are not apt to find him in, and you suspect (if you know him) that he is "shinning" to secure money to meet obligations. If you do find him in he will look over your shoulder while talking with you, as if constantly expecting some disagreeable visitor. If at his desk, he will nervously twist a pencil or pen in and out his fingers; he does not look at you, save for a moment at a time. If you sell him goods he buys them as a sucker takes the hook, without investigation or consideration, and you have a feeling that you have made a bad sale. He is not cordial or desirous of continuing conversation with you. He is gloomy, moody, desperate. He is constantly trying to force away disagreeable necessities until to-morrow. He has a note due at the bank to-day, but he does not pay it. He will take the three days of grace and then renew it at a high rate of interest. Interest is a famishing vulture gnawing at his vitals. He cannot attend to his business. The pain is so great that he must walk the street, get out of doors, where air and sunshine are perfectly free. His rent is not paid for last month. He has

accepted drafts which must be met, but he has no money with which to keep them from going to protest, so he preys on his friends and relatives for money to tide him over. His time is so occupied in attempting to bridge the chasm made by the growing flood of credit he himself started that he has no time to attend to his business. His subordinates have not the judgment or tact to manage as carefully as he needs, and things are going from bad to worse constantly. He exchanges checks with friends and deceives his banker as to his real condition. His employees are his creditors, and also are solicited to borrow money from friends to loan to him. His property is mortgaged to its full value. He borrows money with which to pay dividends or supposititious profits, in order to deceive the innocents whom he has roped into his business. He pays no bills until he is obliged to in order to save action at law. He is a miserable man—a felon by implication. When he goes home he has no word for his wife and children, who have grown to have a little circle of their own into which the father does not enter. His mind is so worn with constant drudgery that it is near to breaking down with his credit and his business. Is there any man more pitiable? And why is he in this condition? Because he is six months behind in his calculations and his life is one continual jump, hampered as by heavy weights, to make up the six months and bring himself to date.

Engineer Menocal, of the Nicaragua Canal, just returned, gives a very flattering account of the progress of the survey. The perfected route as it now stands is at least 25 per cent. better than the one of 1885. The then estimated length of 40.5 miles has been cut down to 28.5 miles, and the minor surveys now going on are expected to reduce this to nearer 28 miles. The heaviest part of the work is the making of a cut 119 feet deep through a 2½ mile stretch of solid rock. About 16 miles of the work will be dredged and the balance of the 9 miles is firm, low-lying ground that will only have to be dug to a depth of 20 feet. The canal is to be 120 feet wide through the greater part of the distance, with sharply sloping sides that will not have to be walled up. Through the rock section it will be but 80 feet wide with nearly vertical sides. The whole canal will have an average depth of 30 feet and will be able to accommodate the deepest draft vessels. Mr. Menocal expects to get authority to commence the work of construction at an early day.

The great majority of the convicts at present confined in the New York State prisons are idle, as the result of the passage of the prison bill at the extra session of the Legislature. As many as possible are employed in making repairs. Sing Sing alone previously turned out 3300 pair of shoes daily, and from 175 to 200 stoves.

Steamship men in New York are not in the least surprised that the Umbria arrived out on the other side many hours before the new steamship City of New York, bound to the same port, and the expectation that the latter will eventually rank among the fastest steamers afloat is in no wise diminished. To have forced the engines of the City of New York to their utmost capacity would have been ruinous, mechanically and financially. Even under the moderate stress to which she was subjected on her initial trip havoc was made with the brass boxes. Steamships might be named which developed surprising speed at the commencement of their career, beyond anything they were again able to attain. It is an unenviable reputation that is gained at so large a cost.

### The Barton Bell Company.

This company have completed their factory at Marion, Ind., and are now ready to supply the wants of the trade in their line. They have two buildings, both of brick, with iron roofs. One is two stories high, 110 x 32, and constructed on the plan called "mill construction"—i. e., instead of floor and roof joists placed near each other they have girders 31 feet 6 inches in length and 14 x 8 inches running across the building 10 feet from centers upon which was laid double flooring. The second building is one story, brick, 90 x 32 feet, with steep roof, one-third pitch. The only woodwork in this building is the roof joists, window frames and sash. This latter building is the foundry, while the lower story in the two-story building is for offices and turning, polishing and plating bells, and the second story for the Strapping department and for assembling the various goods manufactured, as well as for storing the stock of finished goods. In the construction of these buildings the company have complied with the specifications recommended by the New England Manufacturers' Mutual Insurance Association, and the risk has been pronounced one of the best in the West. They have also added materially to their machinery. The rolling barrels were manufactured by Henderson Bros., Waterbury, Conn., and are constructed so that the air and dust are exhausted from the barrels, thus protecting the health of the operatives employed in that department and resulting in a superior finish to those Bells which go on the market without additional polishing. The engine is a high-speed automatic engine, manufactured by Chandler & Taylor, Indianapolis, Ind. The boiler is made of three-eighth steel by the Erie City Iron Works, Erie, Pa. They claim to have a model plating room. The dynamo is a Mather machine, and was furnished by the Eddy Electric Company, Windsor, Conn. The polishing and buffing room is fitted up with patent spring bearing polishing lathes, which insure a steady motion of the wheels and consequently a superior class of workmanship. There is a natural gas well connected with the works, supplying an abundance of natural gas for the numerous processes requiring heat.

The company are enthusiastic as to the advantages of their new location, both as a producing and distributing point. They say: "Owing to the fertility of the soil farm produce is abundant and cheap and the price of labor is low. Marion is situated about the center of the Indiana gas field and the county wholly overlies the gas bearing stone, a failure to procure gas never having occurred in Grant County, of which Marion is the county seat. Marion is about centrally located in the circle formed by the following cities: Toledo, Detroit, Cleveland, Columbus, Cincinnati, Louisville, St. Louis and Chicago. We have three lines of railroads—the Pennsylvania system (Columbus and Chicago division); the Cincinnati, Wabash and Michigan, running from Indianapolis to Benton Harbor, Mich.; and the Toledo, St. Louis and Kansas City, running from Toledo to St. Louis. We have three express lines—the Adams, United States and American; also the Western Union telegraphic service. Marion has, in addition to natural gas, artificial gas and electric lights for illuminating, and a bountiful supply of artesian well water. Its superior geographical position, natural gas and the other advantages enumerated make it a most desirable place for the manufacture of our goods, which are consumed largely in the West and Northwest. We wish to call the attention of the trade to advantages which will accrue to them: Possibility of lessening the

cost of goods will inevitably result in lower prices to the consumer; the great saving in freight rates owing to our favorable location, and the fact that they will be able to procure quickly Sleigh Bells, which are generally wanted at once or not at all.

### Recent Legal Decisions.

#### TRADE-MARK—DAMAGES FOR INFRINGEMENT.

F., a dealer in shoes, used the trade-mark of B.—"C. Benkert & Son"—on 250 dozen pairs of boots and shoes, and a suit was brought for the infringement. The damages claimed were the profits made on the goods sold, but defendant insisted that he should account only for the difference these boots and shoes would have sold for without the plaintiff's trade-mark on them, and the price at which they were sold with the trade-mark on them. In this case—Benkert *vs.* Fider—brought in the United States Circuit Court, Northern District of California, the court gave the plaintiff the full profits. Judge Sawyer, in the opinion, said: "The rule of damages insisted upon by the defendant is not the proper measure of damages. I am unable to adopt any such rule. It would be extremely indefinite, and equivalent to giving no damages or profits at all. How would it be possible for any one to say how much less a pair of boots or shoes would sell without than with the trade-mark upon it? There would be no definite measure of compensation for the injury. One who deliberately and knowingly uses another's trade-mark commits a palpable and unmitigated fraud, for which there is no possible excuse. He seeks to avail himself of the good reputation of another's goods, and puts his own goods—which are, usually, if not always, of an inferior quality—upon the market, thereby not only fraudulently cutting off the market from the party who by years of labor, and at great expense, has established a reputation for his wares, but in addition to this injury destroys or injures largely that reputation which is the foundation of the owner's business, by selling inferior goods under his trade-mark, thereby leading the world to believe that these inferior goods are those of the genuine maker. In my judgment the defendant should account, at least, for the entire profit made by him on the sale of the goods with the fraudulent trade-mark on them. There is no just analogy with respect to profits and damages between the infringement of a trade-mark and a patent for an improvement in a machine. A machine may embrace inventions for half a dozen improvements, for each of which a patent is held by different individuals. One machine might infringe them all, and then each patentee could recover the profit attributable to his separate invention. The trade-mark sells the whole article, however inferior or injurious in that particular, and prevents the sale of the owner's goods of equal amount. At least that is the fraudulent purpose and the natural tendency, whether always accomplished or not; and the injured party should have, at least, the whole profit resulting from the wrongful act, and such I understand and hold the rule to be. The damage may be much more arising from destroying the reputation of the owner's goods."

#### ASSIGNMENT FOR BENEFIT OF CREDITORS.

L. made a general assignment to A. on October 26, and A. at once went into possession and began to sell the property. On November 12 L. died, but A. continued to sell and dispose of the property after his death. Two months after L.'s death the balance of the stock was sold at auction, and A. applied most of the proceeds to the

preferred debts specified in the judgment. An unpreferred creditor attacked A.'s course, and sought to hold him personally liable for the appropriation of the property, but was defeated in the action, Chattanooga Stove Company *vs.* Adams, and an appeal was taken to the Supreme Court of Georgia, where the judgment was affirmed. Judge Simmons, in the opinion, said: "Though we do not agree with the court below that the assignment was valid, yet no fraud being alleged in making it, and it being shown that the assignee has acted throughout in good faith, we cannot hold him liable as one acting as an executor without authority can be held liable. This is not a case where a person intermeddles after the death of person with the goods of the deceased, but is one where the owner has put him into possession, under a deed, before his death."

#### ATTACHMENT—MALICIOUS ACTION.

H. & Sons were creditors of B. & McC., and they could not make a prompt collection of their bill for goods sold, and they caused an attachment to be issued, on the ground that B. & McC. were about to dispose of their property to defraud their creditors. H., who made the affidavit, said he thought he had good grounds for his action; that he had called on the firm for payment, and that B. had said to him that McC. was neglecting the business, by frequenting drinking saloons during business hours, putting the whole burden on him, and that he, H., took the course he did fearing that a chattel mortgage would be put on the stock in trade. B. & McC. were solvent, and before the attachment was served the debt was paid. But the sheriff's officer remained in the store, refusing to leave, though B. assured him that the debt had been paid, until he, B., brought word from H. & Sons that there was no claim; and he did remain until a clerk from H. & Sons came and told him that the matter had been arranged. And the principal daily paper in the city stated: "In the Superior Court, yesterday, I. H. Hinchman & Sons swore out an attachment against Charles R. Brand and Gilbert McCullough." Damages were shown in the suit brought for malicious prosecution, and a judgment was recovered for \$625 in the case, Brand *vs.* Hinchman, and the defendant appealed to the Supreme Court of Michigan, where an affirmance was had. Judge Morse, in the opinion, said: "Defendants contend that an action for malicious prosecution will not lie unless there has been a seizure of property, or the arrest of a person, but here there was, at least, a technical taking possession of property. 2. It is further contended that the action will not lie for a civil action based upon a claim, but we are notified that this action is maintainable. Plaintiffs show they were damaged by the course taken, and that there was no reasonable ground for the attachment. There are few, if any, wrongs for which the law does not provide a remedy, and if a man is hurt or damaged in his property, business, credit or reputation by the malicious commencement or prosecution of a civil suit, without probable cause, the better doctrine is that he can maintain an action for his hurt or damage."

Since July 1, 1888, Fairbanks & Co., St. Louis, have sold 14 Westinghouse engines, aggregating 1280 horse-power. They are now preparing plans for the power plant of the Omaha and Council Bluffs Bridge and Railways Company's electric railway.

An alleged discovery of nickel in Logan County, Kansas, causes much excitement in that region.

### Lavigne's Breech-Loading Yacht Cannon.

An improved saluting cannon for yachts, known as the Lavigne patent breech-loader, has been recently brought out by R. H. Brown & Co., New Haven, Conn. Fig. 1 shows the general appearance of the cannon, and Fig. 2 illustrates the working of the breech block. The special feature to which the manufacturers

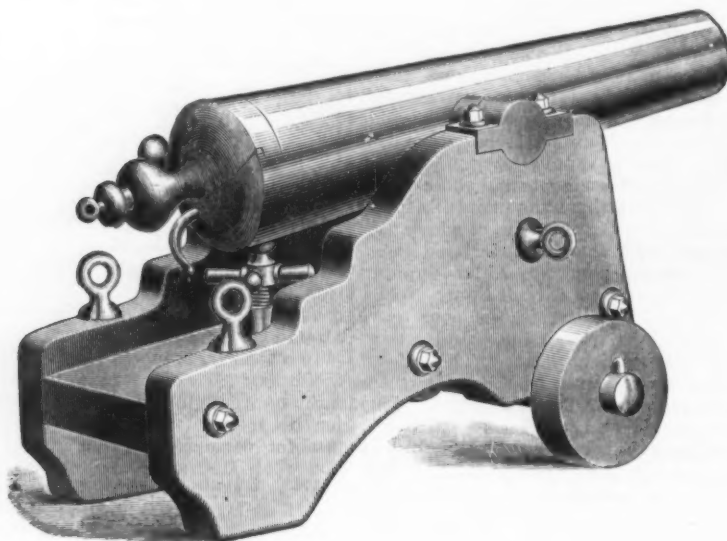
inches, and they also inform us that muzzle loading can be remodeled into breech loading guns with this block. The Lavigne cannon is designed to take standard shot shells, either paper or brass, thus avoiding the trouble of having special shells made to order.

At last Louisville, Ky., has a genuine cotton factory in course of erection which will be completed and running by Decem-

the machinery, &c., and Mr. Lane, manager of above factory, will be manager and superintendent of the new works, the old small concern being absorbed by the new company. The capital stock of the company is \$500,000, with \$200,000 paid in. The president is W. A. Robinson, and the directors are from among the most energetic and successful men of the city. The product of the mill will be entirely warp, and they will begin with an order for \$80,000 from one woolen factory. If the warp mill meets with ready success as is expected, the company will next year put up another factory, to run on sheetings and plaids.

### The Eon Fence Post.

A very practical metal fence post has been invented and patented by Charles S. Long, of Aurora, Ill. The constantly increasing scarcity of timber in many parts of the country caused his attention to be drawn to this matter, and, after years of experiment, he has perfected the Eon post. It is clearly shown in the accompanying illustration, which also covers details of the various parts. It consists of an iron or steel bar, with a base of asphaltic concrete, crushed or pulverized stone pressed on it while hot by a powerful machine. The bar is of trigonal section, as shown by B in the cut, although



Lavigne's Breech-Loading Yacht Cannon.—Fig. 1.—Breech Closed.

direct attention is the strength and simplicity of the breech block mechanism. Fig. 1 shows the breech block swung around to permit loading. It will be noticed that the pivot is directly above the bore, the advantage claimed for this construction being that the pressure is equally distributed, so that there is no danger of the breech opening when the cannon is discharged. Furthermore, the heavy rib B, Fig. 2, which, as shown, ex-

ber 1st. The Louisville Cotton Mills Company have located their plant at the intersection of the Short Line Railroad and Shelby street. They have 17 acres of ground and a frontage of 600 feet on the railroad. A switch has been run in, by which they are receiving the heavy materials for construction. The warehouse is nearly completed, measuring 150 x 60 feet, and is for storing both raw material and stock. The factory is in course of

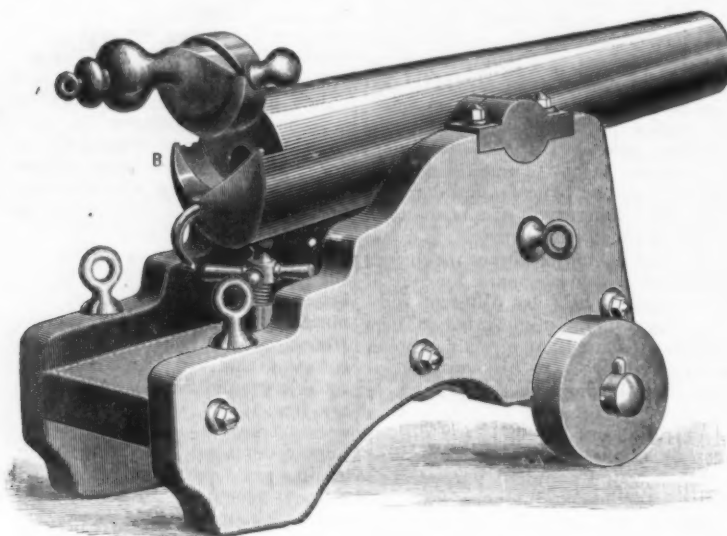
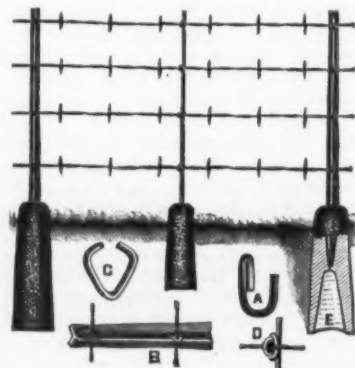


Fig. 2.—Breech Open.

tends above the bore, gives a strong support to the breech block. Another feature of this arrangement is that it allows for an increased length of barrel, from 2 inches on the small size to 6 inches on the large size. To fire the cannon a lanyard is attached to the pin A, Fig. 2, and pulled directly back, thus releasing the hammer which explodes the primer. Messrs. Brown & Co. are preparing to furnish the cannon in sizes of 12, 18, 24 and 28

erection, and will be 305 x 78 feet, three stories high. There will also be engine house and dye houses. The engine is an Eastern Corliss, 400 horse-power, made at Providence, R. I. All of the machinery is new and made expressly for this mill. It was designed by Eastern experts. Home capital almost entirely controls the enterprise. Mr. J. L. Peck, owner of a small warp mill formerly operated in Louisville, has the direction of purchasing

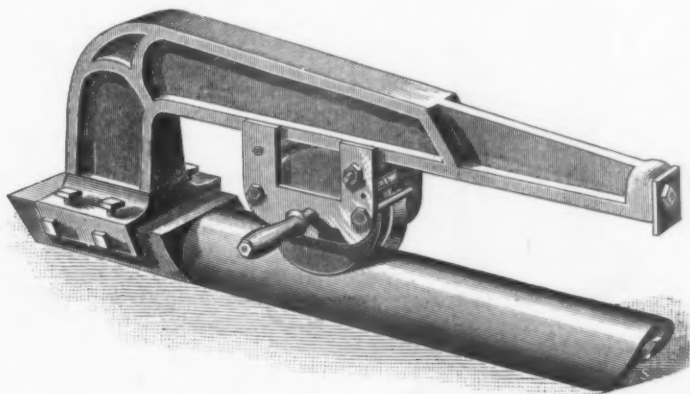


The Eon Fence Post.

other shapes could be made, if desired. Each revolution of the rolls make one post, which can thus be easily tapered, so as to be heaviest at the place most likely to be broken. Nibs on the rolls 1 inch apart leave a thin web, which can be punched out to space fence wires as wished. In the cut A represents the stay for fastening the fence wire to the post; C holds the wire in the loop of the stay; D shows how C is used. The stay is made of No. 1 stiff wire. Boards can be used with these posts as well as wires. An ordinary post will contain about 5 pounds of metal. The base, as will be seen by the part cut away at E, has a cavity in the bottom, which adds to its rigidity when in position. A special machine, designed and patented by Mr. Long, is used for pressing the bases on the posts, pressing on five per minute. This base is claimed by the inventor to be moisture and water proof, so that frost cannot disintegrate or crack it, while at the same time there is no seam or crevice between the post and the base, so that water cannot enter to rust the metal nor can frost take effect at that point. The inventor desires to make arrangements for the manufacture of this post on royalty, and solicits correspondence. The arrangement will include the right to use his patent press for the bases. He further states that they can be produced at very low cost.

### New Grooving Machine.

A. V. Allen, Joplin, Mo., is introducing a new form of grooving machine, an idea of which will be gained from the accompanying engraving. The lower part of the machine consists of a common hollow mandrel, a tool well known to all sheet-metal workers. Above this is fast-



New Grooving Machine, Made by A. V. Allen, Joplin, Mo.

ened a goose-neck under which runs the grooving roll. Mr. Allen informs us that any mandrel may be used, provided it is straight, or the machine is supplied fitted to the mandrel, as the preferences of the buyer may be. Special attention is directed to the fact that the power is applied directly to the grooving wheel, and that no complicated gearing is required. The features of construction in the machine are so clearly shown in the cut that extended description is unnecessary. The maker asserts that this machine is the result of long experience, and the careful trial of a considerable number of those machines which have preceded it in the market.

The Suez Canal is the cause of atmospheric changes which may have an effect of great importance in shaping the destiny of Egypt. Rains are now falling in Cairo and along the delta of the Nile, before almost unheard of. Dr. Chas. S. Robinson, of this city, notices the arrival of "new forces of disruption from without," and climatic changes most unexpected and peculiar, so that even the mummies, so long preserved in their dry cerements, are now liable to perish from the presence of moisture, before unknown, which percolates through their rocky covering. He says: "Whereas at least until 1878 such a thing as rain was entirely unknown in Cairo, there is nowadays one perpetual and almost tropical downpour, commencing in November and lasting until March," which accounts for the prevalence of typhoid and other forms of malarial fever. And, as might be expected, the manner of constructing dwellings and the mode of life are undergoing a radical change. Roofs must now be made water-tight and "fire-places and stoves have already made their appearance," instead of the old-time open braziers. The prospect of a new market for stoves, so near the equator, and from causes so remarkable, will scarcely escape the attention of American manufacturers.

A fatal collision of the Pacific steamers City of Chester and Oceanic a week ago inside the Golden Gate was almost a repetition in its general features of the disaster that befel the Geiser and Thingvalla off Newfoundland a week before. In the latter case sight was obscured by heavy rain, while the City of Chester was run into amidships during a thick fog, the consequence of which was that she instantly sank in deep water, with a loss of 13 lives. Until there

is some method of signaling by means of light or sound when the weather is thick, collisions at sea are unavoidable.

### New Double Seamer.

F. P. Baldwin, of Baldwinsville, N. Y., is introducing a new machine for compressing the double seams on rib or raised

seam roofs. A general view of the device is presented in the first of the accompanying engravings, while the other illustrations show the work performed by it at different stages of the operation. The machine is designed for closing the seams



New Roofing Double Seamer.—Fig. 1.—General View of Baldwin's Seam Compressor.

known as standing seams on all kinds of metal roofs, including tin, iron and copper. It is comparatively new to the trade, although it has been in practical use for two years past, and in that time has demonstrated its general utility. The maker asserts that it can be used on old as well as new roofs. It consists of a pair of wheels lying flat on the roof and intended to grasp the seam, a pair of shoes or slides by which the machine is propelled in a way to avoid injury to the roofing, and the handle for operating. The wheels are adjustable, so that the seam can be closed more tightly at the bottom than at the top, thereby securing a water-tight seam and at the same time avoiding the danger of cracking the metal at the top of the seam. In using this device the seams are turned in

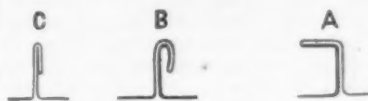


Fig. 2.—Different Stages of the Work.

the usual way. After the double seam is turned as shown in Fig. B of the second engraving, which may be accomplished with the mallet or tongs, the compressor is put in place and pushed down the roof. The effect of the machine is shown in C of the engraving referred to. The maker advises in the use of this machine the keeping of the springs loose at the outset and

tightening them up as familiarity with the machine is gained. The maker claims that in using this machine an absolutely water-tight seam is produced; further, that the work is done faster and easier than by the old plan, and that the seams are uniform and more perfect than can be produced in any other way. At the intersection of the standing seam with the cross-seams, the latter, it is claimed, are closed more perfectly than can be accomplished by any other device now in use. The further advantage, to which allusion is made in the circular before us, is that the use of this device avoids heavy and laborious stamping, and does not jar the roof, which, in many cases, is very objectionable. A number of testimonials are presented from those who have used this device, all speaking of it in the highest terms, and several referring to the use of this device on roofs which had been leaky and which were entirely cured by this plan.

About three months ago there was completed in Russia a railway nearly 900 miles in length, connecting Central Asia with all important points in Russia, called the Trans-Caspian. Respecting its commercial importance a correspondent of the *Journal de St. Petersburg* recently wrote: "What an immense field is opened to commerce by the new line! Thanks to it, the rich Turcoman carpets, the wool of merinos, the silk of Bokhara, the leather, the silk stuffs of Samarcand and the products of the minor industries of these countries can in 12 or 13 days not only reach the Russian commercial centers, but also those of Paris, Vienna, Berlin and London. The railway has animated the desert countries of the Turcomans so that they are not now recognizable. The populations of the cities of Askhabad, Merv and Tchardjoui have rapidly increased. The sandy island and

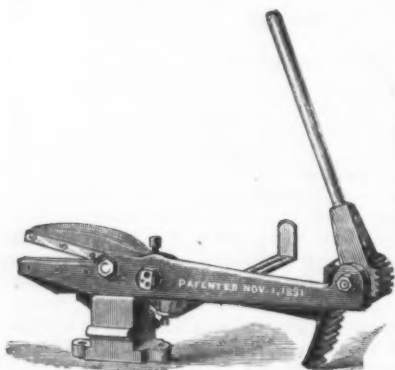
desert of Ouzoun-Ada are transformed into a bay of the first order, with a town having its streets, squares, bazars and a church. It is entirely owing to the railway that the gigantic undertaking of the restoration of the dyke of Sultan-Bent, on the Mourgah, destroyed 300 years ago, can be executed, and thereby call back into life the ancient granary of Central Asia."

The steamship City of Birmingham sailed from Savannah on Friday for Philadelphia with a cargo of 2100 tons of pig iron brought from Alabama furnaces by the Georgia Central Railroad.

Findlay, Ohio, now has six gas wells all "gushers," whose combined capacity is about 40,000,000 cubic feet of gas per day.

### The Eureka Shear.

The Smith & Egge Mfg. Company, Bridgeport, Conn., are offering the tract a very effective tool for cutting wire rod, and sheet metal in strips, a view of which is presented in the accompanying illustration. From an inspection of the engraving it will be seen that the device consists of a stock shear, the jaws of which are actuated by a rack and pinion movement. At the end of one arm of the shear is a segmental rack, in which engages a pinion attached to the second arm of the shear. The pinion is turned by a lever, clearly shown in the engraving. By this arrangement of parts great power is secured. Attached to the jaws, and projecting at right angles to them, is a gauge for convenience in cutting metal to length. In cutting round wire steel dies are inserted in the shear, and these are adjustable for different sizes. In the construction of the dies and cutters we are informed that the best tool steel is employed. As will be seen from the engraving, provision is made for attaching the shear to a bench, or, if preferred, it can be placed securely in a vise.

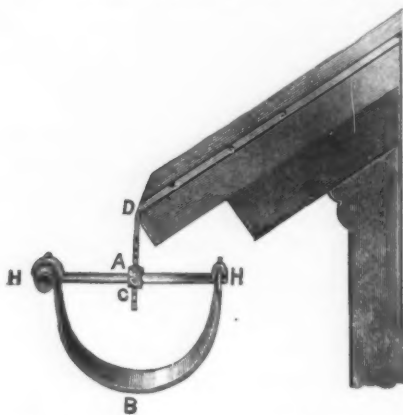


The Eureka Shear.

It is made in two sizes, No. 1 cutting round metal up to  $\frac{1}{4}$  inch and sheet metal up to  $\frac{1}{8}$  inch, while No. 2 has a capacity for cutting round metal up to  $\frac{1}{2}$  inch and sheet metal up to  $\frac{3}{8}$  inch. The company claim that the device can be operated with great ease, that it is very convenient in a metal-working factory or hardware store, that it is simple and durable, and of a price which places it within the reach of all.

### New Eave-Trough Hanger.

Mr. Henry B. Todd, of Meriden, Conn., has recently patented and is now offering to the trade an improved adjustable eaves-



New Eave-Trough Hanger.—Fig. 1.—Hanger Applied to Trough and Fastened to the Roof.

trough hanger, the general construction of which is indicated in the accompanying engravings. Fig. 1 of the illustrations

shows the hanger in position, while Fig. 2 represents the cross-bar and strap. It will be found convenient for reference to bear in mind that similar letters indicate similar parts of the hanger. In the engraving

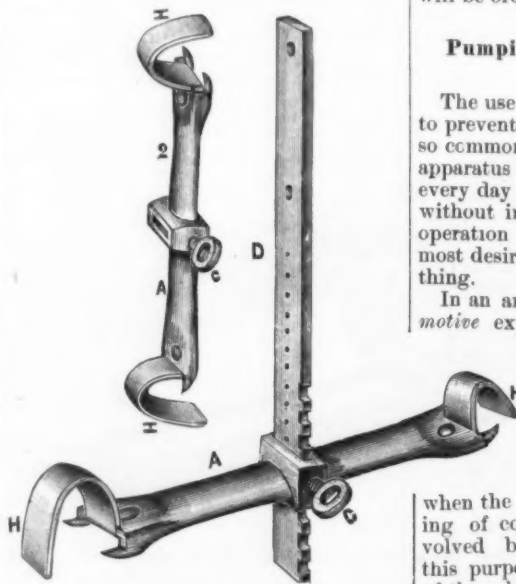


Fig. 2.—Cross Bar and Strap.

ings A represents a cross-piece of malleable iron, provided at each end with two sharp projections or points. Between the latter, and fastened to each end of the cross-bar, is a clasp H H, designed to fold over the edges of the trough and force the points above referred to through the metal composing it. This is accomplished by means of special tools furnished by the manufacturer. The strap D, shown in Fig. 2, inserted in the cross bar, is provided with notches at one end, into which is turned a set-screw, firmly holding it in place. The dots upon the side of the strap are designed for convenience in giving the trough the proper pitch or slant. The first strap is intended to be bent at the first dot, as at D, Fig. 1; the second strap at the second dot, and so on for as many hangers as are required for any particular trough. This, it is claimed, will give the proper slant, provided the building is level, but if not the trough can be lowered still further by means of the notches and set-screw already mentioned. In fastening the cross-bar to the trough the edge of the latter is inserted between the two projections and the clasp, as shown at H, the points being forced through the tin by compressing the clasp. The points on the opposite end are forced through under the sole, while the strap clasps it on the outside. By this means the cross-bar is attached to the trough in a very substantial manner, and without the use of solder. The manufacturer states that special machinery and tools have just been completed for making the clasps shown at H H in the engravings of the toughest kind of wrought material. The parts are formed and riveted to each end of the cross-bar, as shown in Fig. 2 of the illustrations, when the whole is neatly tinned. The maker claims that the use of these fasteners save much time and labor in putting up eave-troughs, and at the same time present a very neat appearance. The use of these hangers is said to allow of the adjustment of the trough at any pitch desired, and also of its easy removal for painting or repairs. The hanger is very durable in all its parts, and has been thoroughly tested. The goods are packed for shipment in one gross boxes, the straps varying in length from 8 to 12 inches.

A director of Denver says the coal traffic of the road is enormous, the Rock Island alone taking 1000 tons per diem, and ship-

ments are made over the Quincy as far as Lincoln, Neb. Anthracite is shipped as far as Kansas City and there competes with the Eastern product. Equipment is behind necessities. More locomotives and cars will be ordered.

### Pumping Solvents into Boilers.

The use of something to remove scale or to prevent its formation in steam boilers is so commonly necessary that some sort of apparatus for introducing it into a boiler every day in the form of a solution, and without interfering in the least with the operation of the boiler, will be found a most desirable, convenient and economical thing.

In an article on the subject the *Locomotive* explains that in most steam plants if the use of a solvent is found to be necessary there is no way to get it into the boilers without shutting them down, cooling off, and introducing it through the manhole or hand-hole. If this is done only

when the boilers are opened up for cleaning of course no extra expense is involved but as a rule the stoppages for this purpose are so far apart that the use of the solvent amounts to very little, as in the natural course of running it will be entirely blown out and lost long before the next charge can be introduced. If a stop is made as often as the solvent should be introduced for the special purpose of putting it in, great and unnecessary expense is involved. The loss entailed by one such stoppage would more than pay for a proper apparatus for introducing it daily or oftener if desired, and in the form of a solution. And it is plain that small quantities in solution introduced at short intervals will be much more effective than a large quantity at longer intervals, and, when water is very bad, a much greater quantity of the solvent can be used in a given time than can be where large quantities are put in at longer intervals. For illustration, with some waters a charge of 30 pounds of soda ash once a month might cause serious trouble for a while after it was put in, but 1 pound a day could not possibly injuriously affect the working of the boiler.

Our contemporary accordingly gives an engraving of a very simple apparatus for attaining the desired result. It can be attached to any pump or injector at a very slight expense. To the upper end of the suction pipe of the feed pump another pipe is connected by means of the T, and extended to any convenient height. This pipe is provided with a stop valve, and carries on its upper end a receptacle for the solution which it is desired to put into the boiler. This may be an iron or a wooden vessel, as may be preferred, and of any required size. This vessel is filled with the solution while everything is running as usual. If the pump is drawing its supply, the only thing necessary to do is to open the valve connecting with the vessel above and its contents will be put into the boiler with a few strokes of the pump, when the valve may be again closed until it is wanted for use again. If, on the contrary, the pump is drawing its supply from some source which exerts pressure, more or less, as is frequently the case, the stop valve in suction pipe should be closed while the connection to the open vessel of solvent is open, or it would be driven out of the top of the vessel. But in either case a few moments suffice to complete the operation without any interruption to the operation of pump or boilers.

The Germans have successfully established themselves at 14 trading ports on the coast of Zanzibar.

# CURRENT HARDWARE PRICES.

AUGUST 29, 1888.

Note.—The quotations given below represent the Current Hardware Prices which prevail in the market at large. They are not given as manufacturers' prices, and manufacturers should not be held responsible for them. In cases where goods are quoted at lower figures than the manufacturers' name, it is not stated that the manufacturers are selling at the prices quoted, but simply that the goods are being sold, perhaps by the manufacturers, perhaps by the jobbers at the figures named.

## Ammunition.

Caps, Perfection, 1000—	
Clicks & Goldmark's	
F. L. Waterproof, 1-10's	dis 50¢
E. B. Trimmer Edge, 1-10's	dis 50¢
E. B. Ground Edge, Central Fire, 1-10's	dis 50¢
Double Waterproof, 1-10's	dis 50¢
Musket Waterproof, 1-10's	dis 50¢
G. D.	dis 50¢
A. B.	dis 50¢
Union Metallic Cartridge Co.	
F. C. Trimmer	dis 50¢
F. L. Ground	dis 50¢
Stan. Fire Ground	dis 50¢
Double Waterproof	dis 50¢
Double Wa' rproof, in 1-10's	dis 50¢
A. B. Genuine Imported	dis 50¢
Key's E. B.	dis 50¢
Key's D. Waterproof, Central Fire	dis 50¢

Cartridges	
Rim Fire Cartridges	dis 50¢
Rim Fire Military	dis 50¢
Central Fire, Pistol and Rifle	dis 50¢
Central Fire, Military & Sporting	dis 50¢
Blank Cartridges, except 22 and 32 cal., an additional 10¢ over above discounts.	
Blank Cartridges, 22 cal.	dis 50¢
Blank Cartridges, 32 cal.	dis 50¢
Primed Shells and Bullets	dis 50¢
B. B. Caps, Round Ball	dis 50¢
B. B. Caps, Conical Ball, Swaged	dis 50¢

Primers	
Berdan Primers all sizes, and B. L. Caps for	
Sturtevant Shells	dis 50¢
All other Primers, all sizes	dis 50¢

Shells	
First quality, 4, 8, 10 and 12 gauge, dis 25¢	
First quality, 14, 16 and 20 gauge (10 list)	dis 50¢
Star, Club, Rival and 10 gauge, 80 list	dis 50¢
Climax Brands, 12 gauge, 80 list	dis 50¢
Club, Rival and Climax Brands, 14, 16 and 20 gauge	dis 50¢
Seibold's Combination Shot Shells	dis 50¢
Brass Shot Shells, 1st quality	dis 50¢
Brass Shot Shells, Club, Rival and Climax	dis 50¢

Shells Loaded—	
List No. 10, 1887	dis 20¢

Wads	
U. M. C. & W. R. A.—B. E., 11 up	dis 30¢
U. M. C. & W. R. A.—B. E., 9&10	dis 30¢
U. M. C. & W. R. A.—B. E., 7&8	dis 30¢
U. M. C. & W. R. A.—B. E., 11 up	dis 30¢
U. M. C. & W. R. A.—B. E., 9&10	dis 30¢
U. M. C. & W. R. A.—B. E., 7&8	dis 30¢
U. M. C. & W. R. A.—B. E., 11 up	dis 30¢
U. M. C. & W. R. A.—B. E., 9&10	dis 30¢
U. M. C. & W. R. A.—B. E., 7&8	dis 30¢

Anvils—Eagle Anvils	dis 10¢
Peter Wright's	dis 10¢
Armstrong's Mouse Hole, Extra	dis 10¢
Trenton	dis 10¢
Wilkinson's	dis 10¢
I. & Riley Carr. Patent Solid	dis 10¢

Wells Vise and Drill	
Wells Falls Co.	dis 10¢
Cheney Anvil and Vise	dis 10¢
Allen Combined Anvil and Vise	dis 10¢
Moore & Barnes Mfg. Co.	dis 10¢

Augers and Bits	
Douglas Mfg. Co.	dis 10¢
New Haven Copper Co.	dis 10¢
Wm. A. Ives & Co.	dis 10¢
Humphreysville Mfg. Co.	dis 10¢
French, Swift & Co. (H. Beecher)	dis 10¢
Cook's, Douglas Mfg. Co.	dis 10¢
Cook's, New Haven Copper Co.	dis 10¢
Ives' Circular Lip	dis 10¢
Patent Solid Head	dis 10¢
C. E. Jennings & Co., No. 10, extension lip	dis 10¢
C. E. Jennings & Co., No. 30	dis 10¢
C. E. Jennings & Co., No. 10, extension lip	dis 10¢

Wet, 32¢, quarters, No. 5, 10; No. 25, 30	dis 10¢
Lewis' Patent Single Twist	dis 10¢
Russell Jennings' Augers and Bits	dis 10¢
Imitation Jennings' Bits (new dist.)	dis 10¢
Fugh's Black	dis 10¢
Car Bits	dis 10¢
L'Hommedieu Car Bits	dis 10¢
Forstner Pat. Auger Bits	dis 10¢

Wells Augers	
Ives	dis 10¢
French, Swift & Co.	dis 10¢
Douglas	dis 10¢
Bonney's Adjustable	dis 10¢
Stearns	dis 10¢
Ives' Expansive, each \$4.50	dis 10¢
Universal Expansive, each \$4.50	dis 10¢
Wood's	dis 10¢

Expansive Bits	
Clark's small, 18; large, 20	dis 10¢
Ives' No. 4, per doz.	dis 10¢
Stearns' No. 1, 25; No. 2, 30	dis 10¢
Stearns' No. 3, 35	dis 10¢

Gimlet Bits	
Common	dis 10¢
Diamond	dis 10¢
"Bee"	dis 10¢
Double Cut, Shephardson's	dis 10¢
Double Cut, Ct. Valley Mfg. Co.	dis 10¢
Double Cut, Hartwell's, 7 gro.	dis 10¢
Double Cut, Douglas's	dis 10¢
Double Cut, Ives'	dis 10¢

Bit Stock Drills	
Morse Twist Drills	dis 10¢
Standard	dis 10¢
Cleveland	dis 10¢
Syracuse, for metal	dis 10¢
Syracuse, for wood (wood list)	dis 10¢
Williams' or Holt's, for metal	dis 10¢
Williams' or Holt's, for wood	dis 10¢

Wells Augers	
L'Hommedieu's	dis 10¢
Watrous's	dis 10¢
Snell's	dis 10¢
Snell's Ship Auger Pat'n Car Bits	dis 10¢

Awl Hairs	
Sewing, Brass Ferrule	dis 10¢
Patent Sewing, Short	dis 10¢
Patent Sewing, Long	dis 10¢
Patent Peg, Plain Top	dis 10¢
Patent Peg, Leather Top	dis 10¢

## Awls, Brad Sets, &c.

Awls, Sewing, Common	dis 10¢
Awls, Shouldered Peg	dis 10¢
Awls, Patent Peg	dis 10¢
Awls, Shouldered Brad	dis 10¢
Awls, Handled Brad	dis 10¢
Awls, Handled Scratch	dis 10¢
Awls, Socket Scratch	dis 10¢

Awl and Tool Sets	
Allen's Sets, Awls & Tools, No. 20	dis 10¢
Tray's Ad Tool Hds.	dis 10¢

Miller's Falls Adj. Tool Hds.	dis 10¢
Henry's Combination Haft	dis 10¢
Brad Sets, No. 42, 10, 50, No. 43, 12, 50	dis 10¢
Brad Sets, Stanley's Excelsior, No. 1, 7, 50	dis 10¢
Brad Sets, Stanley's Excelsior, No. 2, 14, 00	dis 10¢
Brad Sets, Stanley's Excelsior, No. 3, 15, 50	dis 10¢

Axes	
Makers' and Special Brands	
First quality	dis 10¢
Others	dis 10¢

Axle Grease	
Fraser's, in bulk	dis 10¢
Fraser's, in boxes	dis 10¢
Dixon's Everlasting, in bxs.	dis 10¢
Dixon's Everlasting, 10-2 pails, each, 8¢	
Lower grades, special brands	dis 10¢

Axles—No. 1, 4¢; No. 2, 5¢; No. 3, 6¢	
No. 7 to 18	dis 10¢
No. 19 to 25	dis 10¢
National Wrought Steel Tubular Self-Oiling	
Standard Farm (1 to 5) and Special Farm (1 to 5)	dis 10¢
Over 10 sets	dis 10¢
XX Strong Exp. (6 to 9), XX Strong Truck (10 to 16)	dis 10¢
Over 10 sets	dis 10¢

Bag Holders	
Sprengle's Pat. 7 doz \$18	dis 10¢
Salances—Spring Balances	
Common 24"	dis 10¢
Chatillon's Spring Balances	dis 10¢
Chatillon's Circular Spring Balances	dis 10¢

Bells	
Light Brass	dis 10¢
Extra Heavy	dis 10¢
White Metal	dis 10¢
Silver Chime	dis 10¢
Globe (Cone's Patent)	dis 10¢

Doors	
Gong, Yankee	dis 10¢
Gong, Barton's	dis 10¢
Crank, Taylor's	dis 10¢
Crank, Broderick's	dis 10¢
Crank, Cone's	dis 10¢
Crank, Connel's	dis 10¢
Lever, Sargent's	dis 10¢
Lever, Taylor's Bronzed or Plated	dis 10¢
Lever, Taylor's Japanned	dis 10¢
Lever, H. E. & Co.'s	dis 10¢
Full, Brook's	dis 10¢
Full, Western's	dis 10¢

Common Wrought	dis 10¢
Western	dis 10¢
Western, Sargent's list	dis 10¢
Kentucky "Star"	dis 10¢
Kentucky, Sargent's list	dis 10¢
Dodge, Genuine Kentucky, new list	dis 10¢
Texas Star	dis 10¢

Bellevue—Blacksmiths	dis 10¢
Molders	dis 10¢
Hand Bellevue	dis 10¢

Belting, Rubber	
Common Standard	dis 10¢
Standard	dis 10¢
Extra	dis 10¢
N. Y. & P. Co., Extra Standard	dis 10¢

Beach Staps	
Vorrell's	dis 10¢
Hotchkiss's	dis 10¢
Weston's, per doz No. 1, 10; No. 2, 10	dis 10¢
McGill's	dis 10¢

Bits—Auger, Gimlet Bit Stock, Drills, &c., see Augers and Bits.	
Bit Holders	
Extension, Barber's	dis 10¢
Extension, Ives'	dis 10¢
Diagonal	dis 10¢
Angular	dis 10¢

Blind Adjusters	
Domestic	dis 10¢
Excelsior	dis 10¢
Washburn's Self-Locking	dis 10¢

Blind Fasteners	
Macrell's	dis 10¢
Van Sand's Screw Pattern	dis 10¢
Van Sand's Old Pattern	dis 10¢
Washburn's Old Pattern	dis 10¢
Merriman's	dis 10¢
Austin & Eddy No. 2006	dis 10¢
Security Gravity	dis 10¢

Blind Staples	
Barbed, 1/4 in. and larger	dis 10¢
Barbed, 1/4 in.	dis 10¢

Blacks	
Ordinary Tackle, list April 17, '85	dis 10¢
Cleveland Block Co., Mal. Iron	dis 10¢
Novelty Tackle Blocks, Mal. Iron	dis 10¢

Belts	
Door and Shutter	
Cast Iron Barrel, Square, &c.	dis 10¢
Cast Iron Shutter Bolts	dis 10¢
Cast Iron Chain (Sargent's list)	dis 10¢
Cast Iron Door Bolts	dis 10¢
Wrought Barrel	dis 10¢
Wrought Square	dis 10¢
Wrought Shutter, all Iron, Stanley's list	dis 10¢
Wrought Shutter, Brass Knob, Stanley's	dis 10¢
Wrought Shutter, Sargent's list	dis 10¢
Wrought Sunk Flush, Sargent's list	dis 10¢
Wrought Sunk Flush, Stanley's list	dis 10¢
Wrought S. & S. Flush, Com'n Stanley's list	dis 10¢

Calipers—See Compasses.	
Calks, Tee	
Gautier	dis 10¢
Dewicks	dis 10¢

Cann Owners	
Messenger's Comet	dis 10¢
Duplex	dis 10¢
Lyman's	dis 10¢
No. 4, French	dis 10¢
No. 5, Iron handle	dis 10¢
Sardine Solers	dis 10¢
Star	dis 10¢
Sprague, No. 1, 2	dis 10¢

Carriage	
Com. list June 10, '84	dis 10¢
Genuine Eagle, list Oct. '84	dis 10¢
Phila. pattern, list Oct. '84	dis 10¢
St. B. & W. old list	dis 10¢

Common, list Feb. 28, 1883	dis 10¢
P. C. B. & N. Co., Emptre, list Feb. 28, 1883	dis 10¢
P. C. B. & N. Co., Philadel., list Oct. '84	dis 10¢
P. C. B. & N. Co., Keystone, Phil., list Oct. '84	dis 10¢
P. C. B. & N. Co., Norway, Phil., list Oct. '84	dis 10¢
Am. S. Co., Norway, Phil., list Oct. '84	dis 10¢
Am. S. Co., Eagle, Phil., list Oct. '84	dis 10¢
Am. S. Co., Philadel., list Oct. '84	dis 10¢
Am. S. Co., Bay State, list Feb. 28, '83	dis 10¢
R. B. & W., Philadel., list Oct. 16, 1884	dis 10¢
R. B. & W. Mfg. Co.	dis 10¢

Stove and Range	
Stove	dis 10¢
Am. S. Co. Stove, Annealed	dis 10¢
R. B. & W. Stove	dis 10¢
R. B. & W. Stove	dis 10¢
Machine	dis 10¢
Bolt Ends	dis 10¢

Bores	
Boeing Machines	
Without Augers	dis 10¢
Upright	dis 10¢
Angular	dis 10¢
Douglas	dis 10¢
Snell's, Rice's Patent	dis 10¢
Jennings	dis 10¢
Other Machines	dis 10¢
Phillips' Pat. with Augers 7, 80	dis 10¢

Boys Pins	
Humason, Beckley & Co.'s	dis 10¢
Sargent & Co.'s	dis 10¢
Peck, Stow & W. Co.	dis 10¢

Braces	
Barcus, Nos. 110 to 114 and 31 to 33	dis 10¢
Barcus, Nos. 6, 8, 12, 14	dis 10¢
Barcus, Nos. 16, 18, 20, 22, 7, 9, 11	dis 10¢
Barber's, Nos. 10 to 16	dis 10¢
Barber's, Nos. 30 to 33	dis 10¢
Barber's, Nos. 40 to 63	dis 10¢
Barber's, Nos. 5, 10 and 12	dis 10¢
Barber's, Plated, Nos. 5, 10 and 12	dis 10¢
Osgood's Ratchet	dis 10¢
Spofford's	dis 10¢
Ives' New Haven Novelty	dis 10¢
Ives' New Haven Ratchet	dis 10¢
Ives' Barber Ratchet	dis 10¢
Ives' Ratchets	dis 10¢
Ives' Spofford's	dis 10¢
Common Ball, American	dis 10¢
Bartholomew's, Nos. 27, 30	dis 10¢
Bartholomew's, Nos. 117 118 119	dis 10¢
Amidon's Barker's Imp'd Plain	dis 10¢
Amidon's Barker's Imp. Nickle	dis 10¢
Amidon's Ratchet	dis 10¢
Amidon's Eclipse Ratchet	dis 10¢
Amidon's Globe Jawed	dis 10¢
Amidon's Corner Brace	dis 10¢
Amidon's Universal	dis 10¢
Amidon's Buffalo Ball	dis 10¢
P. S. & W.	dis 10¢

Brackets	
Shelf, plain, Sargent's list	dis 10¢
Shelf, fancy, Sargent's list	dis 10¢
Reading, plain	dis 10¢
Reading, Rosette	dis 10¢

Bright Wire Goods	
Brollers	
Bent's Self-Basting	dis 10¢
Buckets—See Well Buckets and Pails	
Bull Rings—Union Co. Nut	dis 10¢
Sargent's low list	dis 10¢
Humason, Beckley & Co.'s	dis 10¢
Peck, Stow & W. Co.'s	dis 10¢
Elrich Hdw. Co., White Metal, low list	dis 10¢

Butcher's Cleavers	
Bradley's	dis 10¢
L. & J. White	dis 10¢
Beatty's	dis 10¢
16.50 19.00 21.50 24.00 27.00 30.00 33.50 38.50	
New Haven Edge Tool Co.'s	dis 10¢
P. S. & W.	dis 10¢

Butts	
Wrought Brass	dis 10¢
Cast Brass, Floubou's	dis 10¢
Cast Brass, Corbin's Fast	dis 10¢
Cast Brass, Loose Joint	dis 10¢
Cast Iron	
Fast Joint, Narrow	dis 10¢
Fast Joint, Broad	dis 10¢
Loose Joint	dis 10¢
Loose Joint, Japanned	dis 10¢
Loose Joint, Jap. with Acorns	dis 10¢
Parliament Butts	dis 10¢
Mayer's Hinges	dis 10¢
Loose Pin, Acorns	dis 10¢
Loose Pin, Acorns, Jap. Pltd. Tips	dis 10¢
Wrought (Steel)	
Fast Joint, Narrow	dis 10¢
Fast Joint, L. Narrow	dis 10¢
Fast Joint, Broad	dis 10¢
Loose Joint, Broad	dis 10¢



**Adies.**  
M. Melting, Sargent's..... dis 55&10  
Melting, Reading..... dis 35&10  
Melting, Monroe's Patens..... dos. \$4.00, dis 40  
Melting, P. S. & W..... dis 35&10  
Melting, Warner's..... dis 30  
**Lawn Mowers.**  
Standard List..... dis 50&10  
Eaton's..... dis 60  
**Lanterns.**  
Tubular, Plain, with Guards..... dos \$4.00 @ 14.25  
Tubular, Lift Wire, with Guards..... dos \$4.50 @ 14.75  
Tubular, Square Plain, with Guards, dos \$4.00 @ 14.25  
Tubular, Sq. Lift Wire, with Guards, dos \$4.25 @ 14.10  
Wicks, Guards, 35 & 4 dozen less..... dis 10  
Police, small, \$6.00; Med. \$7.25; Large, \$9.75, dis 20&25  
**Lemon Squeezers.**  
Porcelain Lined, No. 1..... dos \$3.00, dis 25&30  
Wood, No. 2..... dos \$3.00, dis 25  
Wood, Common, No. 1..... dos \$1.75 @ 1.75  
Dunlap's Improved..... dos \$3.75, dis 20  
Sammis..... No. 1, \$3; 2, \$4; 12, \$18 dos. dis 25&10  
Jennings' "Star"..... dos \$2.50  
The "Boss"..... dos \$2.50  
Don't..... No. 1, dos \$6.50, 2, \$5..... dis 10  
Little Giant..... dis 50 @ 50&25  
King..... dis 50 @ 50&25  
**Lines.**  
Cotton and Linen Fish, Draper's..... dis 60  
Draper's Chalk..... dis 60  
Draper's Mason's Linen, 84 ft., No. 1, \$1.25; No. 2, \$1.75; No. 3, \$2.25; No. 4, \$2.75; No. 5, \$3.25, dis 25  
Cotton Chalk..... dis 55  
Samsen, Cotton, No. 4, \$2; No. 4 1/2, \$2.50..... dis 30  
River Lake Braids, No. 0, \$9; No. 1, \$5.50; No. 2, \$7.00; No. 3, \$7.50 gross..... dis 25  
Masons' Linen, No. 3 1/4, \$1.50; No. 4, \$2; No. 4 1/2, \$2.50  
Masons' Colored Cotton..... dis 45  
Wire Clothes, No. 18, \$3.60; No. 19, \$3.00; No. 20, \$2.50  
Wire Cord, "Anson Braided, White or Gray, Cotton..... \$7.50 dos. dis 20  
**Locks, Padlocks, Cabinet Locks, &c.**  
**Door Locks, Latches, &c.—**  
List, Dec. 30, '86, third Feb. 2, '87..... dis 50&10 @ 60&25  
Diamond's "New" Locks, &c. made..... dis 50  
Mallory, Wheeler Co., list, July, 1888..... dis 50&10&25  
Sargent & Co., list Feb. 1, 1888..... dis 50&10&25  
Reading Hardware Co., list Feb. 3, '88, dis 50 @ 60&10  
Livingston & Co..... dis 70  
Perrin's Burglar Proof..... dis 60&25  
F. M. Smith's "Extra Heavy Cylinder"..... \$10.50  
Barnes Mfg. Co..... dis 40  
Yale Corrugated Key..... dis 33 1/2  
Diets Flat Key..... dis 30  
L. & C. Round Key Latches..... dis 30&10  
F. M. Smith's Cabinet and Combination..... dis 30&10  
Romer's Night Latches..... dis 15  
Yale new list..... dis 33 1/2  
"Shepherd" or "U. S."..... dis 35  
"Felter" or "American"..... dis 40  
Seed's N. Y. Hasp Lock..... dis 25  
**Cabinets.**  
Eagle, Gaylord Parker and List March, '86, revised Corbin..... Jan. 1, '88, dis 33 1/2  
Deits, Nos. 36 to 39..... dis 40  
Diets, Nos. 36 to 39..... dis 40  
Diets, Nos. 36 to 39..... dis 30  
Stoddard Lock Co..... dis 30 @ 33 1/2  
Champion's Night Latches..... dis 40  
Barnes Mfg. Co..... dis 40  
Eagle and Corbin Trunk..... dis 15&25  
Champion's Cabinet and Combination..... dis 30  
Yale..... dis 33 1/2  
Romer's..... dis 25  
**Padlocks.**  
List, Dec. 23, '84..... dis 70 @ 70&10  
Yale Lock Mfg. Co. s..... dis 75 1/2  
Eagle..... dis 25&25  
Eureka, Eagle Lock Co..... dis 40&25  
Romer's "Pat. Scandinavian" &c., Nos. 100 to 105..... dis 30  
A. E. Diets..... dis 40  
"Champion" Padlocks..... dis 40  
Tochats..... dis 30  
"Star"..... dis 45  
"Horse Shoe" dos. \$9..... dis 40  
Barnes Mfg. Co..... dis 40  
Lock's..... dis 30  
Brown's Patent..... dis 25  
Scandinavian..... dis 90  
"Pat. Pat. Scandinavian new list (low)..... dis 60  
**Lumber Tools.**  
Ring Peavies, "Blue Line" Finish..... dos \$20.00  
Ring Peavies, Common Finish..... dos \$18.00  
Steel Socket Peavies..... dos \$21.00  
Mail Socket Peavies..... dos \$18.00  
Cast Hooks, "Blue Line" Finish..... dos \$18.00  
Cast Hooks, Common Finish..... dos \$14.00  
Cast Hooks, Mail Socket Clasp, "Blue Line" Finish..... dos \$10.00  
Cast Hooks, Mail Socket Clasp Common Finish..... dos \$14.50  
Cast Hooks, Clip Clasp, Big, Nos. 100 to 105..... dos \$14.00  
Cast Hooks, Clip Clasp, Common Finish..... dos \$12.00  
Hand Spikes..... dos 6 ft., \$15.00; 8 ft., \$20.00  
Pike Poles, Pike & Hook, 12 ft., 14 ft., 16 ft., 18 ft., 20 ft. dos..... \$11.50 12.50 14.50 17.50 21.50  
"Pike Poles, Pike only, 10 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 55

Pennsylvania.....dis 40&105  
 No. 1.....dis 40  
 Miles Challenge, No. 1.....dis 40  
 Home No. 1.....dis 40  
 Draw Cut, No. 1.....dis 40  
 Beef Shaver, Enterprise Mfg. Co., No. 1.....dis 40  
 Chadborn's Smoked Beef Cutter.....dis 40

**Mining Knives.**  
 Am. 62 quality, 7 gro, 1 blade, 77; 2 blades, 112; 3 blades, 115.  
 Lothrop's.....dis 40  
 Smith's, 7 gro, Single, 22.00; Double, 25.....dis 40  
 Knapp & Cowles.....dis 40  
 Buffalo Adjustable.....dis 40

**Melanes Gates.**—Stebbins' Pat. dis 70&70 & 714  
 Stebbins' Genuine.....dis 60&10&10  
 Stebbins' Tinned Ends.....dis 40&10  
 Chase's Hard Metal.....dis 50&10  
 Bush's.....dis 30  
 Lincoln's Pattern.....dis 60&10  
 Wood's.....dis 30&10  
 Case No. 1.....dis 7.00  
 Case No. 2.....dis 8.00  
 Case No. 3.....dis 9.00  
 Case No. 4.....dis 10.00  
 Case No. 5.....dis 11.00  
 Case No. 6.....dis 12.00  
 Case No. 7.....dis 13.00  
 Case No. 8.....dis 14.00  
 Case No. 9.....dis 15.00  
 Case No. 10.....dis 16.00  
 Case No. 11.....dis 17.00  
 Case No. 12.....dis 18.00  
 Case No. 13.....dis 19.00  
 Case No. 14.....dis 20.00  
 Case No. 15.....dis 21.00  
 Case No. 16.....dis 22.00  
 Case No. 17.....dis 23.00  
 Case No. 18.....dis 24.00  
 Case No. 19.....dis 25.00  
 Case No. 20.....dis 26.00  
 Case No. 21.....dis 27.00  
 Case No. 22.....dis 28.00  
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 Case No. 25.....dis 31.00  
 Case No. 26.....dis 32.00  
 Case No. 27.....dis 33.00  
 Case No. 28.....dis 34.00  
 Case No. 29.....dis 35.00  
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 Case No. 31.....dis 37.00  
 Case No. 32.....dis 38.00  
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 Case No. 34.....dis 40.00  
 Case No. 35.....dis 41.00  
 Case No. 36.....dis 42.00  
 Case No. 37.....dis 43.00  
 Case No. 38.....dis 44.00  
 Case No. 39.....dis 45.00  
 Case No. 40.....dis 46.00  
 Case No. 41.....dis 47.00  
 Case No. 42.....dis 48.00  
 Case No. 43.....dis 49.00  
 Case No. 44.....dis 50.00  
 Case No. 45.....dis 51.00  
 Case No. 46.....dis 52.00  
 Case No. 47.....dis 53.00  
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 Case No. 50.....dis 56.00  
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 Case No. 59.....dis 65.00  
 Case No. 60.....dis 66.00  
 Case No. 61.....dis 67.00  
 Case No. 62.....dis 68.00  
 Case No. 63.....dis 69.00  
 Case No. 64.....dis 70.00  
 Case No. 65.....dis 71.00  
 Case No. 66.....dis 72.00  
 Case No. 67.....dis 73.00  
 Case No. 68.....dis 74.00  
 Case No. 69.....dis 75.00  
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 Case No. 71.....dis 77.00  
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 Case No. 81.....dis 87.00  
 Case No. 82.....dis 88.00  
 Case No. 83.....dis 89.00  
 Case No. 84.....dis 90.00  
 Case No. 85.....dis 91.00  
 Case No. 86.....dis 92.00  
 Case No. 87.....dis 93.00  
 Case No. 88.....dis 94.00  
 Case No. 89.....dis 95.00  
 Case No. 90.....dis 96.00  
 Case No. 91.....dis 97.00  
 Case No. 92.....dis 98.00  
 Case No. 93.....dis 99.00  
 Case No. 94.....dis 100.00

**Money Drawers.**—7 gro, 115 @ \$20.  
 Muzzles.—Safety, 7 gro, 23.....dis 25

**Nails.**—See Trade Report  
 Wire Nails, Standard Penny.....dis 70&10  
 Wire Nails, Standard Penny.....dis 70&10

**Nail Puller.**—Curtiss Hammer.....dis 20  
 Pelican.....dis 20  
 Boss.....dis 20

**Nail Sets.**—Square.....dis 20  
 Round.....dis 20  
 Cannon's Diamond Point.....dis 20

**Nut Crackers.**  
 Table (Hudson & Beckley Mfg. Co.).....dis 40  
 Blake's Pattern.....dis 40  
 Turner & Seymour Mfg. Co.....dis 50

**Nuts.**  
 Nuts, all kinds, 514 off list Jan. 1, 1888.  
 In lots less than 100 lb, 7, add 1/4, 1 lb boxes add 1/2 to list.

**Oakum.**  
 Government.....dis 50  
 U. S. Navy.....dis 50  
 Navy.....dis 50

**Officers.**—Zinc and Tin.....dis 40  
 Brass and Copper.....dis 40  
 Malleable, Hammer, Improved, No. 1, 23.00; No. 2, 24.00; No. 3, 25.00; No. 4, 26.00; No. 5, 27.00; No. 6, 28.00; No. 7, 29.00; No. 8, 30.00; No. 9, 31.00; No. 10, 32.00; No. 11, 33.00; No. 12, 34.00; No. 13, 35.00; No. 14, 36.00; No. 15, 37.00; No. 16, 38.00; No. 17, 39.00; No. 18, 40.00; No. 19, 41.00; No. 20, 42.00; No. 21, 43.00; No. 22, 44.00; No. 23, 45.00; No. 24, 46.00; No. 25, 47.00; No. 26, 48.00; No. 27, 49.00; No. 28, 50.00; No. 29, 51.00; No. 30, 52.00; No. 31, 53.00; No. 32, 54.00; No. 33, 55.00; No. 34, 56.00; No. 35, 57.00; No. 36, 58.00; No. 37, 59.00; No. 38, 60.00; No. 39, 61.00; No. 40, 62.00; No. 41, 63.00; No. 42, 64.00; No. 43, 65.00; No. 44, 66.00; No. 45, 67.00; No. 46, 68.00; No. 47, 69.00; No. 48, 70.00; No. 49, 71.00; No. 50, 72.00; No. 51, 73.00; No. 52, 74.00; No. 53, 75.00; No. 54, 76.00; No. 55, 77.00; No. 56, 78.00; No. 57, 79.00; No. 58, 80.00; No. 59, 81.00; No. 60, 82.00; No. 61, 83.00; No. 62, 84.00; No. 63, 85.00; No. 64, 86.00; No. 65, 87.00; No. 66, 88.00; No. 67, 89.00; No. 68, 90.00; No. 69, 91.00; No. 70, 92.00; No. 71, 93.00; No. 72, 94.00; No. 73, 95.00; No. 74, 96.00; No. 75, 97.00; No. 76, 98.00; No. 77, 99.00; No. 78, 100.00; No. 79, 101.00; No. 80, 102.00; No. 81, 103.00; No. 82, 104.00; No. 83, 105.00; No. 84, 106.00; No. 85, 107.00; No. 86, 108.00; No. 87, 109.00; No. 88, 110.00; No. 89, 111.00; No. 90, 112.00; No. 91, 113.00; No. 92, 114.00; No. 93, 115.00; No. 94, 116.00; No. 95, 117.00; No. 96, 118.00; No. 97, 119.00; No. 98, 120.00; No. 99, 121.00; No. 100, 122.00; No. 101, 123.00; No. 102, 124.00; No. 103, 125.00; No. 104, 126.00; No. 105, 127.00; No. 106, 128.00; No. 107, 129.00; No. 108, 130.00; No. 109, 131.00; No. 110, 132.00; No. 111, 133.00; No. 112, 134.00; No. 113, 135.00; No. 114, 136.00; No. 115, 137.00; No. 116, 138.00; No. 117, 139.00; No. 118, 140.00; No. 119, 141.00; No. 120, 142.00; No. 121, 143.00; No. 122, 144.00; No. 123, 145.00; No. 124, 146.00; No. 125, 147.00; No. 126, 148.00; No. 127, 149.00; No. 128, 150.00; No. 129, 151.00; No. 130, 152.00; No. 131, 153.00; No. 132, 154.00; No. 133, 155.00; No. 134, 156.00; No. 135, 157.00; No. 136, 158.00; No. 137, 159.00; No. 138, 160.00; No. 139, 161.00; No. 140, 162.00; No. 141, 163.00; No. 142, 164.00; No. 143, 165.00; No. 144, 166.00; No. 145, 167.00; No. 146, 168.00; No. 147, 169.00; No. 148, 170.00; No. 149, 171.00; No. 150, 172.00; No. 151, 173.00; No. 152, 174.00; No. 153, 175.00; No. 154, 176.00; No. 155, 177.00; No. 156, 178.00; No. 157, 179.00; No. 158, 180.00; No. 159, 181.00; No. 160, 182.00; No. 161, 183.00; No. 162, 184.00; No. 163, 185.00; No. 164, 186.00; No. 165, 187.00; No. 166, 188.00; No. 167, 189.00; No. 168, 190.00; No. 169, 191.00; No. 170, 192.00; No. 171, 193.00; No. 172, 194.00; No. 173, 195.00; No. 174, 196.00; No. 175, 197.00; No. 176, 198.00; No. 177, 199.00; No. 178, 200.00; No. 179, 201.00; No. 180, 202.00; No. 181, 203.00; No. 182, 204.00; No. 183, 205.00; No. 184, 206.00; No. 185, 207.00; No. 186, 208.00; No. 187, 209.00; 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Syracuse Screw-Drivers Bits.....dis 30 & 30.25  
Screw Driver Bits.....dis 50 & 75  
Screw Driver Bits, Parr's.....dis 50  
Fray & Hild. Seta, No. 5, 11.25.....dis 25 & 10  
P. D. & Co.'s, all Steel.....dis 50

**Screws.**  
Wood Screws—List, Brass, Jan. 27; Iron, July 1, 1887  
Flat Head Iron.....dis 70  
Round Head Iron.....dis 65  
Flat Head Brass.....dis 65  
Round Head Brass.....dis 65  
Flat Head Bronze.....dis 65  
Round Head Bronze.....dis 65

**Machine.**  
Flat Head, Iron.....dis 65  
Round Head, Iron.....dis 65  
Bench Iron.....dis 55  
Bench Wood, Beech.....dis 55  
Bench Wood, Hickory.....dis 55  
Hand Wood.....dis 55  
Lac, Blunt Point.....dis 75  
Coach and Lag, Blunt Point.....dis 75  
Bed.....dis 55  
Hand Rail, Sargent's.....dis 75  
Hand Rail, Humason, Beckley & Co.'s.....dis 75  
Hand Rail, Am. Screw Co.....dis 75  
Jack Screws, Millers Falls.....dis 50  
Jack Screws, P. & W.....dis 50  
Jack Screws, Sargent's.....dis 50  
Jack Screws, Stevens.....dis 50

**Scissors.**  
Lester, complete, 10.00.....dis 25  
Rozers, complete, 10.00.....dis 25  
Noyes Smiths.....dis 25  
**American (Cast) Iron.**.....dis 75  
Pruning.....dis 75  
Barnard's Lamp Trimmers.....dis 75  
Timmers.....dis 75  
Seymour's, List, Dec. 1881.....dis 75  
Helmach's, List, Dec. 1881.....dis 75  
Helmach's, Tailor's.....dis 75  
First quality C. S. Trimmers.....dis 75  
Second quality C. S. Trimmers.....dis 75  
Acme Cast Shears.....dis 75  
Diamond Cast Shears.....dis 75  
Clippers.....dis 75  
Victor Cast Shears.....dis 75  
Hove Bros. & Hubert, Solid Forged Steel.....dis 75  
Cleveland Machine Co., Solid Steel Forged.....dis 75  
Clausen Shear Co., Japaned.....dis 75  
Clausen Shear Co., Nickel, same list.....dis 75

**Sliding Doors.**  
M. W. & Co., list July, 1888.....dis 50  
R. & E., list Dec. 18, 1888.....dis 50  
Corbin's list.....dis 50  
Patent Roller.....dis 50  
Patent Roller, Hartford.....dis 50  
Russell's Anti-Friction, list Dec. 18, 1888.....dis 50  
Moore's Anti-Friction.....dis 50

**Sliding Saws.**  
R. & E., list Dec. 18, 1888.....dis 50  
Sargent's list.....dis 50  
Reading list.....dis 50  
**Ship Tools.**  
L. & J. White.....dis 50  
Albertson Mfg. Co.....dis 50  
Sheen, Horse, Mule, &c.....dis 50

**Horse.**  
Burden's, Perkins', Phoenix, at factory.....\$4.00  
Add 1¢ per kg to above prices.  
**On Wrought.**  
Ton lots.....dis 50  
1000 lb lots.....dis 50  
500 lb lots.....dis 50  
Shot.....dis 50  
Drop, 25 bag, 25 off cash, 5 days.....dis 50  
Drop, 25 bag, 25 off cash, 5 days.....dis 50  
Buck and Chilled, 25 bag.....dis 50  
Buck and Chilled, 5 bag.....dis 50

**Shovels and Spades.**  
Ames Shovels, Spades, &c., list Nov. 1, 1888.....dis 30  
Noyes—Jobbers frequently give 5¢ to 7% extra on above.

**Gr. Mth's Black Iron.**.....dis 50  
Gr. Mth's C. S. Steel.....dis 50  
Gr. Mth's Solid Cast Steel R. R. Goods.....dis 50  
Old Colony (Sanford Fork & Tool Co.).....dis 50  
St. Louis Shovel Co.....dis 50  
Hussey, Blum & Co.....dis 50  
Hubbard & Co.....dis 50  
Lehigh Mfg. Co.....dis 50  
Payne Pettibone & Son, list January, 1888.....dis 50  
Remington's (Lowman's Patent).....dis 50  
Rowland's, Black Iron.....dis 50  
Rowland's, Steel.....dis 50

**Shovels and Tongs.**  
Iron Head.....dis 50  
Brass Head.....dis 50  
Skeins, Thimble.....dis 50  
Columbus Wrt. Steel, list Nov. 1, 1887.....dis 50  
Coldbrookdale Iron Co.....dis 50  
Utica P. S. T. Skeins.....dis 50  
Utica Turned and Fitted.....dis 50

**Stoves.**  
Buffalo Metallic, S. S. & Co., new list.....dis 50  
Barley Flour Sifters.....dis 50  
Smith's Adjustable Sifters.....dis 50  
Smith's Adjustable Milk Strainer.....dis 50  
Smith's Adjustable M. C. Strainer.....dis 50  
Stoves, Wooden (Am.).....dis 50  
Mesh 18, Nested, 70¢.....dis 50  
Mesh 20, Nested, 80¢.....dis 50  
Mesh 24, Nested, 1.00.....dis 50  
Sieves, School, by case.....dis 50

**Snaps, Harnes, &c.**  
Anchor (L. & S. Mfg Co.).....dis 50  
Fitch's (Bristol).....dis 50  
Hotchkiss.....dis 50  
Andrews.....dis 50  
Sargent's Patent Guarded.....dis 50  
German, new list.....dis 50  
Covert, New Patent.....dis 50  
Covert New R. E.....dis 50  
Covert Spring.....dis 50

**Soldering Irons.**  
Covert's Adjustable, list Jan. 1, 1888.....dis 50  
Spoke Shave Iron.....dis 50  
Wood.....dis 50  
Bailey's (Stanley R. & L. Co.).....dis 50  
Stearns.....dis 50

**Spoke Trimmers.**  
Bonney's.....dis 50  
Stearns.....dis 50  
Ives' No. 1, 11.00; No. 2, 11.50; No. 3, 12.00; No. 4, 12.50; No. 5, 13.00; No. 6, 13.50; No. 7, 14.00; No. 8, 14.50; No. 9, 15.00; No. 10, 15.50; No. 11, 16.00; No. 12, 16.50; No. 13, 17.00; No. 14, 17.50; No. 15, 18.00; No. 16, 18.50; No. 17, 19.00; No. 18, 19.50; No. 19, 20.00; No. 20, 20.50; No. 21, 21.00; No. 22, 21.50; No. 23, 22.00; No. 24, 22.50; No. 25, 23.00; No. 26, 23.50; No. 27, 24.00; No. 28, 24.50; No. 29, 25.00; No. 30, 25.50; No. 31, 26.00; No. 32, 26.50; No. 33, 27.00; No. 34, 27.50; No. 35, 28.00; No. 36, 28.50; No. 37, 29.00; No. 38, 29.50; No. 39, 30.00; No. 40, 30.50; No. 41, 31.00; No. 42, 31.50; No. 43, 32.00; No. 44, 32.50; No. 45, 33.00; No. 46, 33.50; No. 47, 34.00; No. 48, 34.50; No. 49, 35.00; No. 50, 35.50; No. 51, 36.00; No. 52, 36.50; No. 53, 37.00; No. 54, 37.50; No. 55, 38.00; No. 56, 38.50; No. 57, 39.00; No. 58, 39.50; No. 59, 40.00; No. 60, 40.50; No. 61, 41.00; No. 62, 41.50; No. 63, 42.00; No. 64, 42.50; No. 65, 43.00; No. 66, 43.50; No. 67, 44.00; 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No. 667, 344.00; No. 668, 344.50; No. 669, 345.00; No. 670, 345.50; No. 671, 346.00; No. 672, 346.50; No. 673, 347.00; No. 674, 347.50; No. 675, 348.00; No. 676, 348.50; No. 677, 349.00; No.

# CURRENT METAL PRICES.

AUGUST 29, 1888.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market reports.

## IRON AND STEEL.

### Bar Iron from Store.

Common Iron:	
1 to 2 in. round and square..	1.90 @ 2.00¢
1 to 6 in. x 1/2 to 1 in. ....	
Refined Iron:	
1 to 2 in. round and square..	2.10 @ 2.25¢
1 to 4 in. x 1/2 to 1 1/2 in. ....	
4 1/2 to 6 in. x 1/2 to 1 in. ....	
1 to 6 in. x 1/2 and 5-16 .....	2.80 @ 2.45¢
Rods—1/2 and 11-16 round and sq. ....	2.30 @ 2.35¢
Bands—1 to 6 x 3-16 to No. 12 .....	2.80 @ 2.45¢
"Burden Best" Iron, base price..	3.00 @ ..¢
Burden's "H. B. & S." Iron, base price..	2.80 @ ..¢
"Ulster" .....	3.10 @ ..¢
Norway Rods .....	4.00 @ 5.00¢

### Merchant Steel from Store.

Open-Hearth and Bessemer Machinery,	
Toe Calk, Tire and Sleigh Shoe, base price in small lots..	2 1/2¢ @ 3¢
Best Cast Steel, base price in small lots 3 1/2¢ @ 4¢	
Best Cast Steel Machinery, base price in small lots..	3 1/2¢ @ 4¢

For Classification and Extras adopted by the Merchant Steel Association of the United States, June 1, 1888, see *The Iron Age*, June 21, 1888.

### Sheet Iron from Store.

	Common American.	R. G. Cleaned.
10 to 16 .....	2.75 @ 2.80¢	3.25 @ ..¢
17 to 20 .....	2.85 @ 3.00¢	3.25 @ 3.50¢
21 to 24 .....	3.00 @ 3.10¢	3.50 @ ..¢
25 and 30 .....	3.30 @ ..¢	3.50 @ ..¢
27 .....	3.35 @ 3.37¢	3.75 @ ..¢
28 .....	3.50 @ ..¢	4.00 @ ..¢
Galv'd, 14 to 20, 1/2 in. 4.50 @ .. 4.58 @ ..		
Galv'd, 1 to 24, 1/2 in. 4.57 1/2 @ .. 4.75 @ ..		
Galv'd, 25 to 28, 1/2 in. 5.25 @ .. 5.12 @ ..		
Galv'd, 27 .....	5.62 1/2 @ .. 5.48 @ ..	
Galv'd, 28 .....	6.00 @ .. 5.85 @ ..	
Patent Plashed .....	10¢ @ 10¢	B. 9¢
Russia .....	9 1/2¢ @ 10¢	B. 9¢
American Cold Rolled B. B. ....	5¢ @ 5¢	7¢

### English Steel from Store.

Best Cast .....	15¢ @ 15¢
Extra Cast .....	16 1/2¢ @ 17¢
Swaged, Cast .....	16¢ @ 16¢
Best Double Shear .....	15¢ @ 15¢
Blister, 1st quality .....	13 1/2¢ @ 13 1/2¢
German Steel, Best .....	10¢ @ 10¢
3d quality .....	9¢ @ 9¢
3d quality .....	8¢ @ 8¢
Sheet Cast Steel, 1st quality .....	15¢ @ 15¢
2d quality .....	14¢ @ 14¢
3d quality .....	13 1/2¢ @ 13 1/2¢

## METALS.

### Tin.

Banca, Pigs .....	24¢
Straits, Pigs .....	24¢
English, Pigs .....	24¢
Straits in Bars .....	25¢

### Tin Plates.

	Charcoal Plates.—Bright.	Per box.
Melyn Grade .....	IC, 10 x 14 .....	\$5.75 @ \$6.00
" .....	IC, 12 x 18 .....	6.00 @ 6.25
" .....	IC, 14 x 20 .....	5.75 @ 6.00
" .....	IC, 20 x 28 .....	12.25 @ 12.50
" .....	IX, 10 x 14 .....	7.25 @ 7.50
" .....	IX, 12 x 12 .....	7.50 @ 7.75
" .....	IX, 14 x 20 .....	7.25 @ 7.50
" .....	IX, 20 x 28 .....	15.25 @ 15.50
" .....	DC, 12 1/2 x 17 .....	5.50 @ 5.75
" .....	DX, 12 1/2 x 17 .....	7.00 @ 7.25
Calland Grade .....	IC, 10 x 14 .....	\$6.00 @ ..
" .....	IC, 12 x 12 .....	6.25 @ ..
" .....	IC, 14 x 20 .....	6.00 @ ..
" .....	IX, 10 x 14 .....	7.50 @ ..
" .....	IX, 12 x 12 .....	7.75 @ ..
" .....	IX, 14 x 20 .....	7.50 @ ..
Allaway Grade .....	IC, 10 x 14 .....	\$5.25 @ ..
" .....	IC, 12 x 12 .....	5.50 @ ..
" .....	IC, 14 x 20 .....	5.25 @ ..
" .....	IC, 20 x 28 .....	10.75 @ ..
" .....	IX, 10 x 14 .....	6.25 @ ..
" .....	IX, 12 x 12 .....	6.50 @ ..
" .....	IX, 14 x 20 .....	6.25 @ ..
" .....	IX, 20 x 28 .....	12.50 @ ..
" .....	DC, 12 1/2 x 17 .....	5.00 @ ..
" .....	DX, 12 1/2 x 17 .....	6.00 @ ..

### Coke Plates.—Bright.

Steel Coke.—IC, 10 x 14, 14 x 20.....	\$4.80 @	.....
10 x 20.....	7.50 @	7.65
20 x 28.....	10.00 @	10.15
IX, 10 x 14, 14 x 20.....		5.60
BY Grade.—IC, 10 x 14, 14 x 20.....	4.70 @	

### Charcoal Plates.—Tern.

Dean Grade.—IC, 14 x 20.....	\$4.62 1/2 @ ..
20 x 28.....	9.25 @ ..
IX, 14 x 20.....	5.62 1/2 @ ..
20 x 28.....	11.37 1/2 @ ..
Abecarne Grade.—IC, 14 x 20.....	4.50 @ ..
20 x 28.....	9.00 @ ..
IX, 14 x 20.....	5.50 @ ..
20 x 28.....	10.80 @ ..

### Tin Boiler Plates.

XXX, 14 x 26 .....	112 sheets..	\$12.50 @ \$12.75
XXX, 14 x 28 .....	112 sheets..	12.75 @ ..
XXX, 14 x 31 .....	112 sheets..	14.25 @ ..

### Copper.

Duty: Pig. Bars and Plates, 15¢ @ 100 lb.	
Western Spelter .....	31¢ @ ..
"Bergenport" .....	29¢ @ ..
"Bertha" .....	29 1/2¢ @ ..

### Ingot.

Lake .....	@ 17.50¢
"Anchor" Brand .....	@ 17¢

## Sheet and Bolt.

Prices adopted by the Association of Copper Manufacturers of the United States, December 10, 1887, being quotations for all sized lots.

	Not wider than	Not longer than	And longer than	Weights per square foot and prices per pound.
	Over 64 oz.	32 to 64 oz.	16 to 32 oz.	14 to 16 oz.
	12 to 14 oz.	10 to 12 oz.	8 to 10 oz.	Less than 8 oz.
30—72 .....	25	25	25	27
30—72 .....	25	25	25	28
36—90 .....	25	25	25	29
36—90 .....	25	25	25	30
48—96 .....	25	25	25	31
48—96 .....	25	25	25	32
60—96 .....	25	25	25	33
60—96 .....	25	25	25	34
84—96 .....	25	25	25	35
84—96 .....	25	25	25	36
Over 84 in. wide .....	28	30		

All Bath Tub Sheets..... 16 oz. 14 oz. 12 oz. 10 oz.  
Per pound..... \$0.28 0.30 0.32 0.35

Bolt Copper, 1/2 inch diameter and over, per pound..... 35¢

Circles, 60 inches in diameter and less, 3 cents per pound advance over lowest prices of Sheet Copper of the same thickness.

Circles, over 60 inches diameter, up to 96 inches diameter, inclusive, 5 cents per pound advance over lowest prices of Sheet Copper of the same thickness.

Circles, over 96 inches diameter, 6 cents per pound advance over lowest prices of Sheet Copper of the same thickness.

Segment and Pattern Sheets, 3 cents per pound advance over price of sheets required to cut them from.

Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, 1 cent per pound over the foregoing prices.

Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, 2 cents per pound over the foregoing prices.

### Copper Bottoms, Pits and Flats.

Per pound.  
14 ounce to square foot and heavier .....

12 ounce and up to 14 ounce to square foot..... 29¢

10 ounce and up to 12 ounce .....

Circles less than 8 inches diameter 2 cents per pound additional.

Circles over 13 inches diameter are not classed as Copper Bottoms.

## Tinning.

Tinning sheets on one side, 10, 12 and 14 x 48 each..... 24¢

Tinning sheets on one side, 30 x 60 each..... 30¢

For tinning boiler sizes, 9 in. (sheets 14 in. x 60 in.), each..... 15¢

For tinning boiler sizes, 8 in. (sheets 14 in. x 50 in.), each..... 12¢

For tinning boiler sizes, 7 in. (sheets 14 in. x 52 in.), each..... 12¢

Tinning sheets on one side, other sizes, per square foot..... 25¢

For tinning both sides double the above prices.

## Planished Copper.

Planished Copper List May 5, 1888..... Net

## Brass and Copper Tubes.

Seamless Copper. Seamless Brass.

1/2 inch 1/2 in. 50¢ 1/2 inch 1/2 in. 47¢

3/4 " " 44¢ 3/4 " " 41¢

1 " " 42¢ 1 " " 39¢

1 1/4 " " 40¢ 1 1/4 " " 37¢

1 1/2 " " 38¢ 1 1/2 " " 35¢

1 3/4 " " 37¢ 1 3/4 " " 34¢

2 " " 34¢ 2 " " 31¢

## Roll and Sheet Brass.

Discount from list..... 10 @ 15 %

## Spelter.

Duty: Pig. Bars and Plates, 15¢ @ 100 lb.

Western Spelter .....

"Bergenport" .....

"Bertha" .....

## Zinc.

Duty: Sheet, 2 1/2¢ @ 100 lb.

600 lb casks .....

## Lead.

Duty: Pig, \$2 @ 100 lb. Old Lead, 2¢ @ 100 lb. Pipe and Sheets, 3¢ @ 100 lb.

American .....

Newark .....

Bar .....

Pipe, subject to trade discount.....

Tin-Lined Pipe, subject to trade discount.....

Block Tin Pipes, subject to trade discount.....

Sheet, subject to trade discount.....

## Solder.

1/2 @ 1/2 (Guaranteed).....

Extra Wiping .....

The prices of the many other qualities of Solder in the market indicated by private brands vary according to composition.

## Antimony.

Cookson .....

Hallett's .....

## Plumbers' Brass Work.

Discount per cent.

Ground Bibbs and Stops.....

Ground Stops, Hydrant Cocks, &c.....

Corporation Cocks.....

## Corporation Cocks, "Mueller" Pattern, from Western list.....

Ground Basin and Shampooing Cocks.....

Compression Basin Cocks.....

Compression Basin and Sink Cocks.....

Compression Pantry Cocks.....

Compression Double Basin and Shampooing Cocks.....

Compression Double Bath Cocks.....

Compression Bibbs, Urinal Cocks, Sill Cocks, Stops, Hopper Cocks, Hydrant Cocks and Ball Cocks.....

Basin Plugs and Basin Grates.....

Bath and Wash Trav Plugs.....

Bath Wastes and Washers, Bath and Basin Valves, Sewer and Vacuum Valves, Cistern Valves, Pump Valves and Strainers, Ship Closet Valves and Suction Baskets.....

Basin Clamps, Basin Joints and Strainers.....

Boiler Couplings, Ground Face, per set \$1.25.....

Boiler Couplings, Plain Face, per set \$1.30.....

Water Back Valve and Plain Couplings, Soldering Nipples and Unions.....

Union Joints.....

Hydrant Nozzles, Handles and Guides, Sockets and Clamps, Street Washer Screws and Guides.....

Hose Goods.....

Steam and Gas Fitters' Brass and Iron Work.

Discount per cent.

Brass Globe Valves.....

Finished Brass Globe Valves, with Finished Brass Wheels.....

Brass Globe Valves, with Patent Wood Wheels.....

Brass Globe Angle and Corner Valves.....

Brass Radiator Angle Valves.....

Brass Radiator Angle Valves, Frink's Patent.....

Brass Cross and Check Valves.....

Brass Check Valves.....

Brass Hose Valves.....

Brass and Iron Frink Valves.....

Brass Safety Valves.....

Brass Vacuum Valves.....

Brass Whistle Valves.....

Brass Balance, Back Pressure and Foot Valves.....

Brass Butterfly and Throttle Valves.....

Brass Pump Valves.....

Brass Steam Cocks.....

Brass Service, Meter and Union Meter Cocks.....

Brass Whistles, Water Gauges and Oil Cups.....

Brass Hollow Plug, Tallow and Globe Oil Cups.....

Brass Lubricators.....

Brass Air Valves.....

Brass Air Cocks.....

Brass Gauge Cocks.....

Brass Cylinder Cocks and Steam Bibbs.....

Brass Swing Joints and Expansion Joints.....

Brass Test Pumps.....

Brass Steam Fittings, Rough.....

Brass Steam Fittings, Finished.....

Brass Union Joints.....

Brass Soldering Unions and Nipples.....

Brass Hose Fittings, Fusible and Boiler Plugs.....

Iron Body Globe, Angle, Cross and Check Valves.....

Iron Body Safety, Throttle, Back Pressure, Butterfly and Foot Valves.....

Iron Cocks, all Iron.....

All Iron Valves.....

## Miscellaneous.

Discount per cent.

Cast Iron Fittings.....

Plugs and Bushings.....

Malleable Iron Unions.....

Malleable Iron Fittings.....

## Paints.

Black, Lamp—Coach Painters.....

Ordinary.....

Black, Ivory Drop, fair.....

Black Paint, in oil.....

Blue, Prussian, fair to best.....

Chinese dry.....

Ultramarine.....

Brown, Spanish.....

Van Dyke.....